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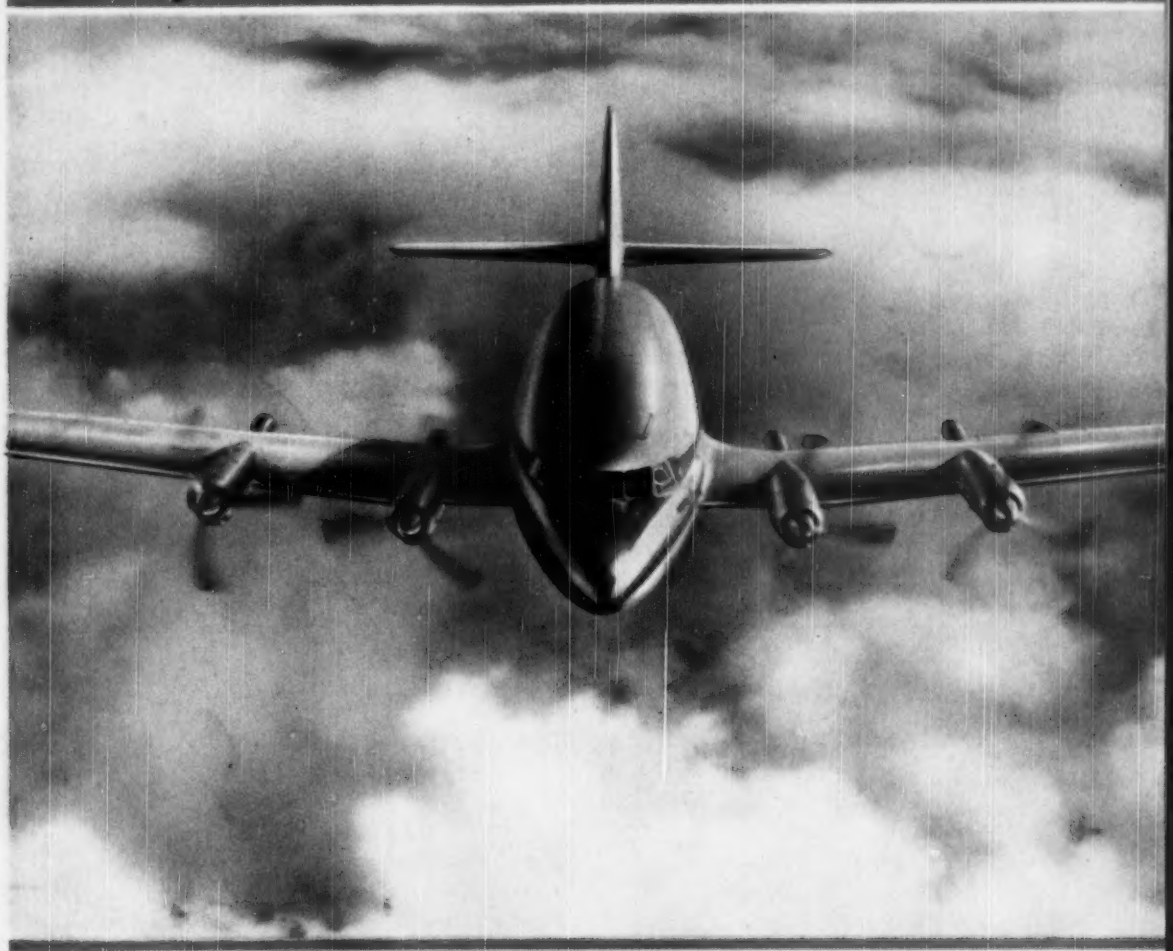

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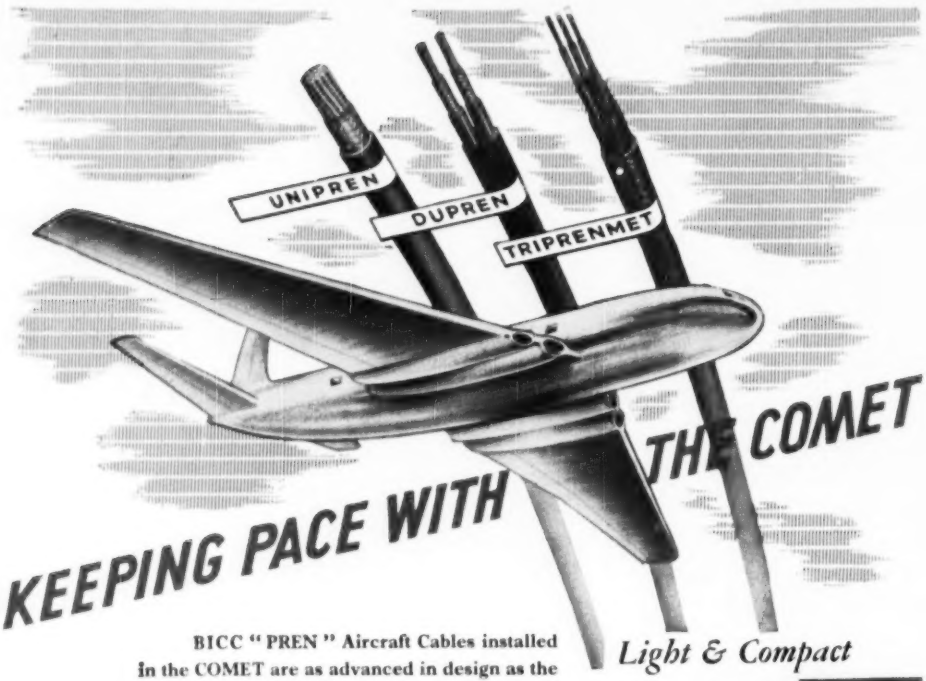

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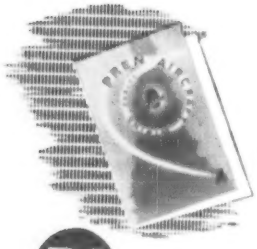

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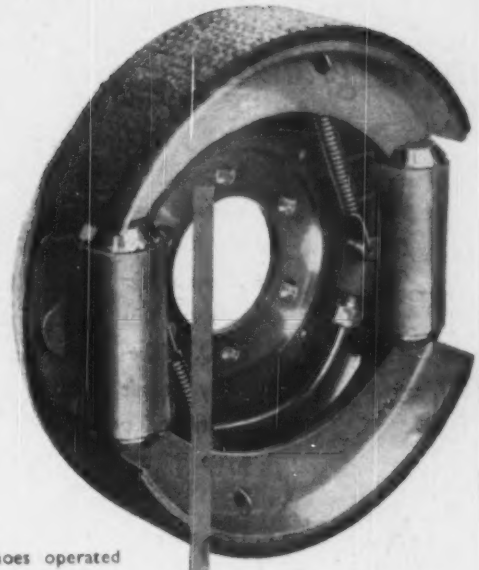

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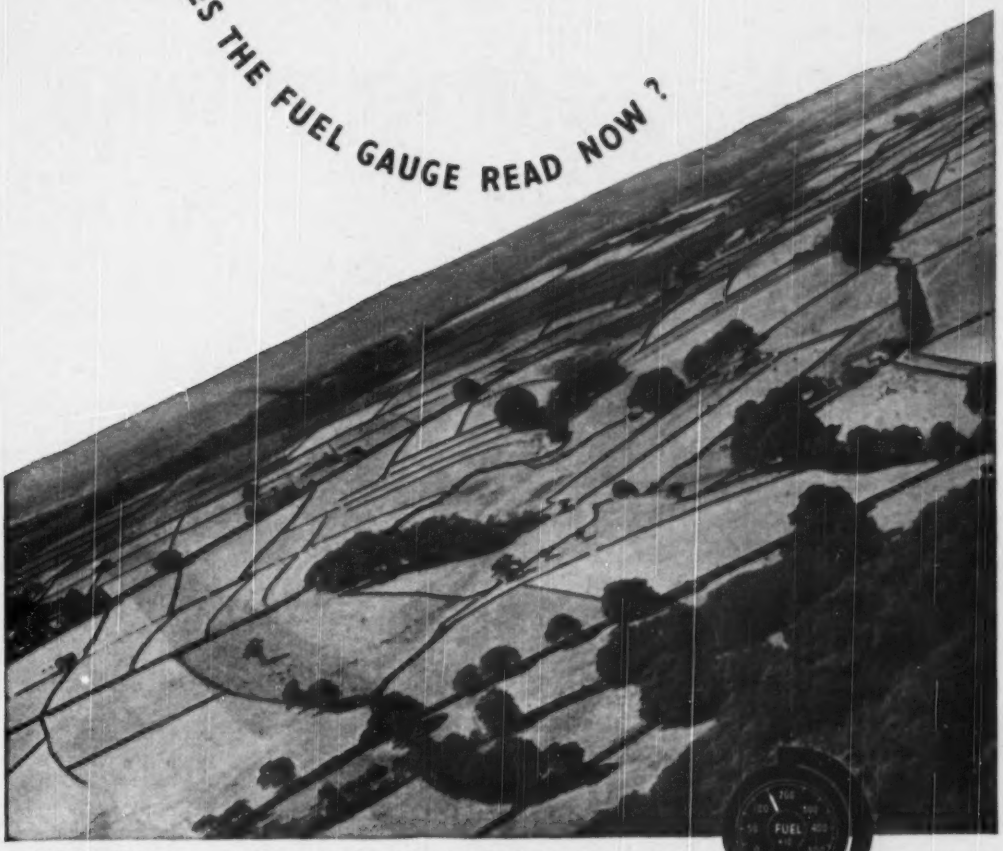

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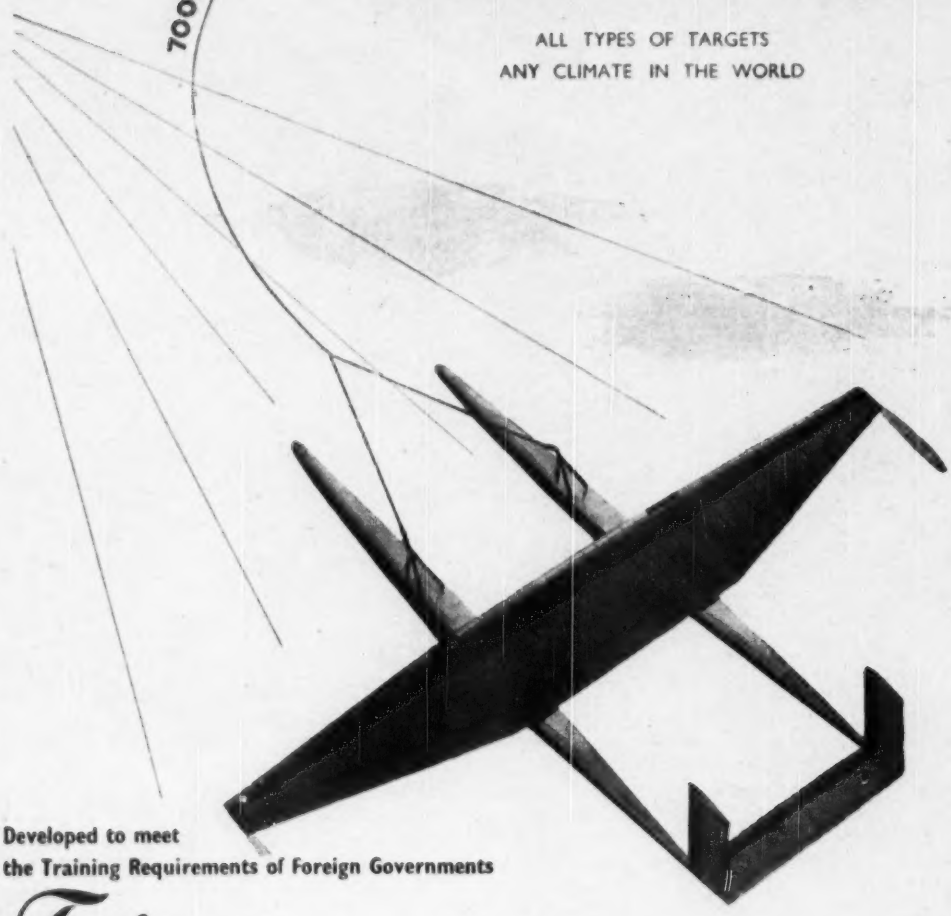

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Founded 1909

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In this issue:

Air-ferry Pantechnicons? 334
At Readiness - - - - 340
Producing the Canberra 343
Flying-ship on the Stocks 344
Quest for Efficiency - - 346
Four Up - - - - 352

A Slightly Sharper Sword

THERE was a time when the annual estimates for the Fighting Services demanded the closest attention and interest from the aircraft industry and from the individual Services themselves. By comparison, this year's *Statement on Defence*, summarized on page 342, is an unenlightening and somewhat unenlightened document, though a little help is given by the memorandum published on the following day, and placed before Parliament by the Air Minister, Mr. Arthur Henderson. In the introduction to the *Statement on Defence*, a great deal is said about commitments, but little enough in plain language about how the country is to meet them.

Over all the Services (though over the Air Force most and the Navy least) hangs the shadow of manpower shortage. Fighters for all-important home defence are being delivered—delivered to stores, for want of the men to maintain them! The unfortunate contraction of Transport Command, described earlier as an economy measure, was also, it seems, to some extent dictated by a secondary economy, namely, the need to transfer ground-crew from this to other operational commands. An uncompromising attitude is adopted by the Prime Minister in his statement, reported on page 341, concerning the curtailment of orders for the Hastings transports.

It would be comforting to be certain that provision in the R.A.F. of living conditions as attractive as those in civilian life would ensure adequate recruitment in regular engagements. Such conditions would be little enough to offer, and the probability is that something even better than civilian life would be required to attract sufficient men to the non-flying branches who—let us face it—have in the main less interesting and lower-paid work to do. The attack on the married-quarters problem at home and abroad is a most welcome step.

That more money is to be made available for the R.A.F. and for research, the bulk of which concerns the R.A.F., is good news indeed. The net total of air estimates is £223 million, an increase of £15,550,000, most of which would be spent on production and research. The importance of the intended strengthening of radar defences cannot be over-estimated, for it is long overdue and has been the cause of real concern, especially in Fighter Command, which is so dependent upon such aids. It is to be hoped that more tangible evidence of the results of earlier research programmes will be apparent in all branches of defence in the coming year. There are still some appalling gaps in our defences.

New Equipment

We have already commented on what seems to us a policy of dubious wisdom—the supplying of numbers of modern jet fighters to Allied foreign governments when some of our own Auxiliary squadrons are still far from adequately equipped. This year, it is learned, the plans to double the jet-fighter strength of Fighter Command will be completed. Again, good news; but let us hope that the double figure—naturally undisclosed—is nearer to being an adequate one for our needs and commitments than has been the case since the war.

It is stated that Canberras will be delivered this year, but it seems very doubtful indeed whether any Canberra squadrons could be operational before the Spring of 1951. Like the Venom fighter, also now ordered for the R.A.F., Canberras are expected to prove most versatile. Photo-reconnaissance, pathfinder, intruder, and even night-fighter duties may come their way. The Venom may be capable of adaptation for two-seater night-fighter duties in the same way as the DH 113, but it is regrettable that week after week passes without announcement of a definite order for a jet night-fighter, the need for which has been apparent for months past.

On the information now available, it is clear that the striking power of the R.A.F. and the Navy, in both attack and defence, will be appreciably increased in the coming months, even though the overall numerical strength in men and aircraft may be increased only by small amounts.

AIR-FERRY PANTECHNICONS?

An Operator's Suggestion for a Short-range, High-capacity "Box-car" Freighter

By HAROLD SEABROOK-SMITH, Assoc. Inst.T.

WITH the development of sea, road and rail transport, the design and construction of specialized vehicles for a specific class of traffic and for specific routes have evolved in parallel. Witness the diverse types of road vehicles, locomotives and their trains, and shipping.

To-day the youngest member of the transport industry—aviation—has reached a comparable stage of evolution, and far greater attention will have to be paid to specialization than has hitherto been the case. In the beginning, of course, it was an achievement to fly at all, let alone construct an aircraft for any specific purpose.

THE author, who has had many years' experience in airline and charter operation, advocates specialization in freighter design: one valuable type, he suggests, would be a large-capacity, high-utilization cargo and passenger machine for short-haul duties. In his "Airbridge," as he calls it, speed would be unimportant and there would be advantages in a reversion to biplane design

The contrasts between the vehicles are great in every form of locomotion: elegant Rolls-Royces and ten-ton lorries serve widely divergent needs on the roads; *Queen Elizabeth* and *Queen Mary* steam alongside tankers, cargo ships and the indispensable tug; and the *Flying Scotsman* would probably not run at all if it were not for the hard-working goods train hauling a string of fully laden trucks half a mile long.

Therefore, just as all these specialized vehicles are built, equipped and operated for a specific purpose, *now* is the time to pay close and careful attention to *specialized industrial aircraft*—aerial argosies designed from the start to incorporate all that is best in engineering practice and modern design (without freakishness) to enable air transport to pay its way. If it cannot be made to pay its way, then it has no justification for existence.

The purpose of this article is to draw attention to the vital need for concentrating on cargo aircraft, in co-operation with the commercial development of air cargo itself. The matter is very urgent, and brooks no delay.

A survey of the aircraft at present available to operators shows that, with two notable exceptions, manufacturers are at a grave disadvantage, inasmuch as they have to make one basic aircraft serve a great diversity of purposes; the inevitable result is an unsatisfactory compromise. (It should be noted here that in this article I am referring solely to British constructors.) So far, it must be admitted, this has been more or less unavoidable, ostensibly because the market for highly specialized aircraft has been either severely limited or is non-existent. I would suggest that the full market-potential for such types has not yet been fully tapped. (I again stress that there are two notable exceptions to this statement.) So far, we have taken scarcely any trouble at all to send salesmen out into the world to find out *exactly* what is wanted for air freighting, and having found it, to come back home and get down to the task of giving the customer what he wants, at the price he can afford to pay; then, having given him the vehicle he wants, to maintain close liaison with him and his sphere of operations, and anticipate his future requirements as his traffic develops.

Specialization is the only way to economical and self-supporting operation (and, incidentally, survival), and a great many old-fashioned ideas on design, construction, marketing and operation must be jettisoned. There is enormous scope for our more progressive and advanced designers; and, as we are dealing with freighters, I would like to iterate my firm conviction that this class of traffic will, in the not-too-distant future, as far outstrip passenger revenue as is currently the case where the older-established forms of transport are concerned.

I agree that this means putting down a large sum of money, and throwing one's bread upon the waters, so to speak, but this is essentially a long-term policy, and one needing great faith and considerable imagination coupled with sound planning. It cannot, by its very nature, be expected to bear fruit next year or the year after.

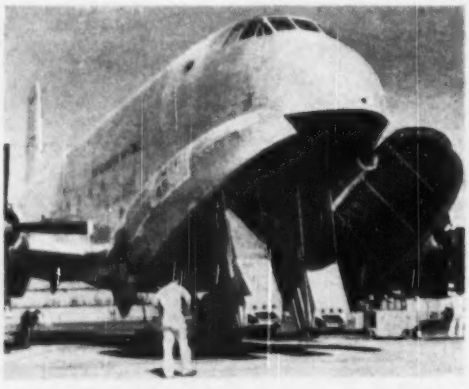
The Market

There is a lot of hard spade-work to be done; but, nevertheless, a 100 per cent industrial aircraft, designed and built after due consideration of the part it is to play, will establish for itself a firm and permanent market among the nations of the world by virtue of filling a very real need. For ourselves, such aircraft will be indispensable to the full and economic development of our Colonial Empire, to give but one example. The needs are there, one might almost say the market is "ready made," and suitable transport is urgently wanted. But we must go out and study these needs, anticipate them, not wait for them to come to us—they will not do that.

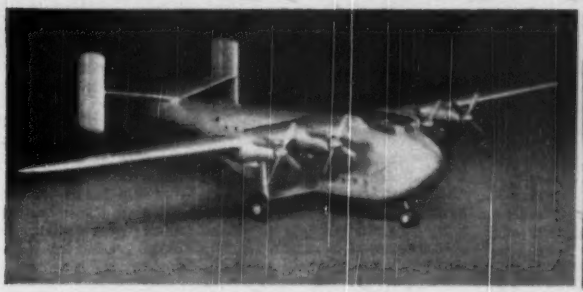
There are, in my view, at least four types of freighter necessary for immediate development. It is impossible to deal with them all within the scope of this article, but in order to make a start, let us give at least one concrete example, and outline the specification.

In passing, I do not think that the future of air cargo will necessarily be confined to fixed-wing landplanes: helicopters will play their part in due course, the flying-boat will make an excellent tramp, and there is a great future for airships, too, if only the powers that be had the imagination and foresight to realize the fact.

The machine I describe here is what I call the "Airbridge," and this title is fairly descriptive of its function—it is just that. The conception is just the largest possible aircraft (consistent with airfield requirements and other limitations), having the largest possible cubic capacity, and the least possible amount of surplus weight (and unnecessary refinements) in the form of structure, fuel, equipment and crew. It is intended solely for cross-channel and inter-island work, river estuaries, etc—terrain where surface transport is either primitive or non-existent, where



The half-tone illustrations accompanying this article show some existing approaches to the problem of designing high-capacity transports—though not of the specialized nature envisaged by the author. Above is the Douglas C-124A military transport.



(Left) Model of the forthcoming Blackburn and General Aircraft Universal transport; (right) The medium-sized Bristol 170 Freighter is widely used. Its true capacity is deceptive, as this photograph shows: the truck seen emerging is a three-tonner.

shipping services are too slow or inadequate, or where the only alternative is a lengthy and time-wasting road diversion. There should be plenty of scope in the world for such a type. Normally, distances of not more than 100-150 miles are envisaged, and the machine is intended to operate on a high-frequency and high-intensity ferry basis, according to local requirements and conditions, which should be the subject of individual study on the spot.

Here, perhaps, I may quote at random a few possible operating spheres for the "Airbridge"; most of them, it will be seen, are comparatively short ferry routes: Lympne-Le Touquet; London-Paris; London-Amsterdam; Weymouth-Cherbourg; Weymouth/Southampton-Channel Islands; Bristol-Cardiff; Portsmouth/Southampton-Isle of Wight; Liverpool-Isle of Man (or the whole I.o.M. area); Holyhead-Dublin; Bristol-Dublin; Copenhagen-Malmö; Stockholm-Visby (Gotland); Copenhagen-Oslo; Stockholm-Helsinki; Harwich-Hook of Holland, Harwich-Flushing; Harwich-Esbjerg; Hull-Esbjerg; Straits of Messina; Naples-Sicily; Tangier-Gibraltar. Obviously, there are scores more farther afield. While the aircraft itself was in the project stage, intensive world-wide research could be simultaneously undertaken with a view to ascertaining its optimum application. Operation should be the responsibility of local operators or municipalities.

Provided that market research on a world-wide scale shows a reasonable prospect of successful sales and operation of such a type, and one that would justify series production, I feel that such a specification has great possibilities. But when I say "series production" I do not mean (initially, at least) that it must be necessary to think in terms of a couple of hundred or so. That happy day will, we hope, come with development and the universally accepted idea that air transport is the *normal* means of transport, and not the exception. At first, production would no doubt be small. Such aircraft, like ships, should therefore be constructed (and made to pay) on a "custom-built" basis. I believe I am right in saying that in shipping practice half-a-dozen units from one "mould" is unusual, and that a dozen—even of coasters—is a rarity. However, this is essentially a production problem, though one which has a most important bearing on the progress of the industrial aircraft.

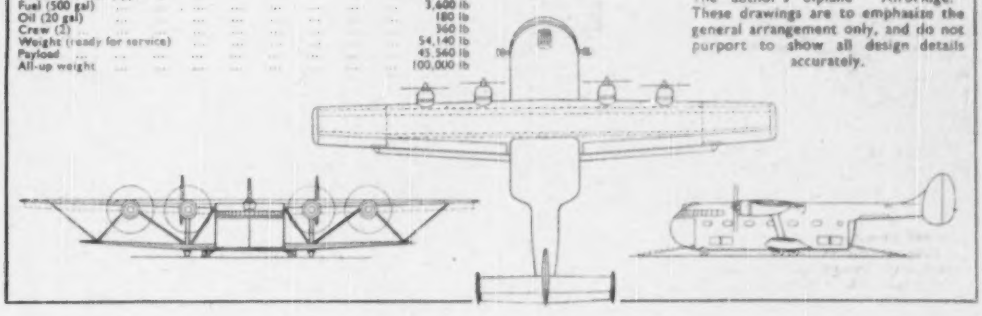
The general idea of the layout will be gathered from the accompanying three-view drawings. It will be of the simplest possible design and construction—robust, accessible in all parts, and above all, easy to maintain. Equipment would also be of the simplest, and in this particular case an exceptionally high percentage of the disposable load would be available to the operator as payload. As it is intended to be a short-haul, high-capacity ferry, able to carry several vehicles, and a quantity of low-density, bulky cargo, there will be exceptional cubic capacity; there is no extra weight or complication with such refinements as retractable undercarriage, supercharging, pressurization, temperature and humidity control, and the host of other things that would be necessary on a long-range, high-performance cargo aircraft. Such a layout might well give ample scope for the use of magnesium, provided it will stand up to the wear and tear involved, with beneficial results to the payload.

As the aircraft is intended for high-intensity operations,

"AIRBRIDGE" DATA

Top wing :—	
Span	140ft
Mean chord	17ft
Area	2,380 sq ft
Aspect ratio	8.2
Lower wings :—	
Span	102ft
Mean chord	10ft
Area (less fuselage area)	820 sq ft
Gross wing area	3,200 sq ft
Weight empty (approx.)	50,000 lb
Disposable load (approx.)	50,000 lb
Fuel (500 gal)	3,600 lb
Oil (20 gal)	180 lb
Crew (2)	360 lb
Weight (ready for service)	54,140 lb
Payload	45,560 lb
All-up weight	100,000 lb

Wing loading	31.25 lb/sq ft
Take-off power loading	12.8 lb/h.p.
Cruising power loading	14.3 lb/h.p.
Take-off run (full load)	750-800 yd
Landing run (full load)	700 yd
Lower-hold capacity	14,000 cu ft
Upper-hold capacity	8,710 cu ft
Total cargo capacity	22,710 cu ft
Lower-hold floor loading	250 lb/sq ft
Upper-hold floor loading	150 lb/sq ft



The author's biplane "Airbridge." These drawings are to emphasize the general arrangement only, and do not purport to show all design details accurately.

AIR-FERRY PANTECHNICONS? . . .

the greatest attention is paid to the necessity for quick turn-round, and to that end the loading and unloading facilities are exceptional. Drive-in ramps are provided fore and aft (this would particularly facilitate the entry and egress of vehicles); there are sliding side doors of ample proportions at truck-bed height on port and starboard sides; and in addition, there is a travelling crane and hoist at the stern for loading and unloading the top deck.

Merely to provide an example, it is suggested here that a number of cars and other vehicles be carried, but it will be obvious that with such a large cubic capacity this will not be the only application. All manner of cargo could be handled, from high-density concentrated loads to bulky and light cargoes of low density, with plenty of room in the main hold—though not an excessive amount, as space is valuable—for freight-handlers, or should one say "stevedores"?) to work. It would also be ideal for the carriage of livestock of all descriptions.

Normal petrol capacity (i.e., maximum tankage) need not be more than 500 gallons, and in practice, bearing in mind the short-range requirements, this would probably be restricted to about 300 gallons. The undercarriage is of the multi-wheel type to spread the load to the best advantage, and would be easily adaptable to caterpillar track for operation in certain parts of the world.

Biplane Layout

Aerodynamically, the machine breaks away from current practice in that it is a semi-cantilever braced biplane of sesquiplane form. The great depth of the fuselage would, I consider, make this possible without causing undue interference, though a certain amount of stagger might be desirable; this could be taken care of by the difference in chord of upper and lower planes. Four Hercules engines are mounted in the top wing, driving tractor airscrews. The upper wing incorporates retractable ailerons, and flaps of ample dimensions run the entire span; there are neither flaps nor ailerons on the lower wing.

The fuselage is of "box-car" proportions; the tail unit, with triple fins and rudders (or a large dorsal single fin if preferred) is carried on a boom extending from the top of the fuselage, at the same time allowing full and complete access to the rear of the cargo hold for loading purposes. The tail boom is fitted with clam-shell doors, through which is lowered the tackle of the overhead hoist for loading cargo to the top deck.

The hold is provided with freight doors for loading fore and aft, with integral "drive-in" ramps which fold up and form part of the flooring when not in use. Thus cars and other vehicles can be driven in at one end and out at the other, without the necessity for reversing down the ramps.

On balance it is considered better to load from the rear, thus eliminating any interference with fuelling and maintenance operations which may be in progress. It is suggested that a pressure-type fuelling system be incorporated.

The idea of adopting the biplane arrangement is to reduce overall dimensions for the same wing area thus making a more compact aircraft, and reducing hangar space, etc. It should also result in a considerable saving in structure-weight, to the benefit of the payload.

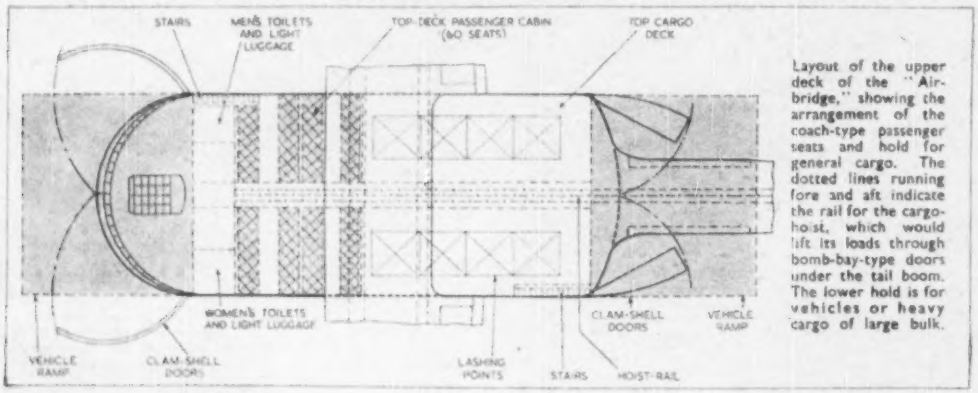
The main cargo hold, which is of rectangular section, thus ensuring the maximum use of cargo capacity, is completely unobstructed throughout its length. It is of exceptional width (20 feet) and is capable of taking three cars abreast, in four (or possibly five) rows line ahead—a total of twelve to fifteen cars or other vehicles. On Channel-ferry and similar operations the car occupants would be accommodated in motor-coach-type seats on the top deck; seating capacity would be about 60.

The top deck is accessible by stairways, and the vehicles would be secured by a quick-acting mechanical device against fore-and-aft movement when in flight. Other cargo, apart from cars, would be carried on the top rear deck, loading being effected by means of the overhead hoist referred to. The passenger cabin is in the extreme nose of the machine, immediately underneath the flight deck, and would afford an exceptionally wide field of view.

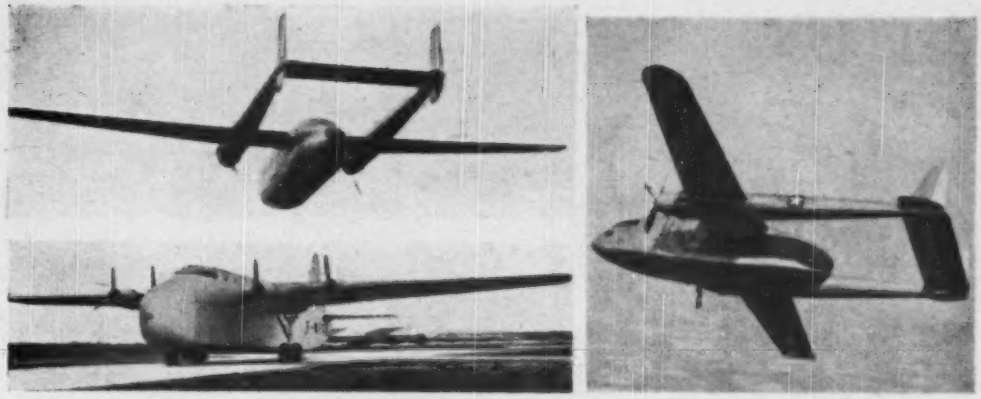
Reversible-pitch airscrews would be fitted as standard, as they permit rapid "backing out" from a loading-bay or ramp, according to the particular application of the aircraft. They also materially reduce the landing-run.

The fixed undercarriage consists of four main wheels arranged bogie-fashion by means of tandem levered-suspension units. In addition, there are four smaller wheels mounted under the nose (two to port, two to starboard), these being considered desirable on account of the exceptional width of the fuselage; they are steerable, and the springing mechanism is contained in the fuselage. Complete stability on the ground when loading and unloading is assured by a retractable jack at the rear end of the cargo hold, and in any case the lowering of the rear ramp would materially assist. The forward and after loading-doors are mechanically operated. Ample tie-down rings of high tensile-strength are provided on the cabin floor, and others sufficiently high up the fuselage walls (about 6 feet), to ensure the safe stowage of any kind of cargo. Sunken rollers are also provided on the cabin floor to assist the easy movement of heavy and bulky items, and a travelling hoist can also be provided, if specified, to work on the roof of the lower hold.

Should the machine be employed on a short route involving one or more stops at which "destination" freight has to be loaded and unloaded, side-doors of ample dimensions can be provided; these are of the sliding type to avoid any possible complications with lorries or other vehicles that may be used, and are at the same level as the floorboard of standard type trucks. Thus the minimum of manual handling is entailed. Due and proper attention is also paid to such essential items as heating for passengers, and adequate lighting for the main holds, both for day and



Layout of the upper deck of the "Air-bridge," showing the arrangement of the coach-type passenger seats and hold for general cargo. The dotted lines running fore and aft indicate the rail for the cargo-hoist, which would lift its loads through bomb-bay-type doors under the tail boom. The lower hold is for vehicles or heavy cargo of large bulk.



Some more approaches : (left) two French designs, the Nord 2500 (above) and the N.C. 211 *Cormoran* ; (right) the Fairchild Packet.

night operations. This is a most essential matter, the importance of which is all too frequently overlooked.

The principal data for this suggested aircraft will be found in the table accompanying the drawings.

With such a machine, designed as it would be for specific tasks, year in and year out, I think we could confidently expect that it would have a useful commercial life of at least 15 to 20 years—possibly more, if the basic fundamental design is good enough. Why not? It would not have to meet the ever-increasing competition of higher and higher cruising speeds, as is the case with the internationally competitive "prestige" airliners, though it *would* have to keep pace with the vast increase of air cargo, and the use of such types by the multitudes as against the select few who can avail themselves of air transport at present. However, as it is essentially an aerial pantechnicon, there is no reason why it should not give excellent service for years and years. To give three classic examples, we still have with us, after many years' loyal service, the Dakota, born in 1935 and still as young as ever, the de Havilland Rapide, which dates from 1934, and the Junkers Ju52/3m, which has only recently gone into honourable retirement (as the Ju52, it started life as a single-engined aircraft in 1930—20 years ago, be it noted—and "grew" three engines, *circa* 1932-1933). I do not suppose for one moment that at the time these designs were on the drawing board their designers imagined they would still be doing a good job of work some 14 or 15 years later. But the fact remains that they are ; and that being the case, why not *design* for longevity?

Another important factor is that it will scarcely be possible to amortize such aircraft in the customary five-year period (indeed it would be undesirable), and they would be designed for long service ; this period should be extended to at least ten to twelve years—possibly fifteen in exceptional cases, according to cost, operational revenue, intensity of utilization and other relevant factors. Incidentally, an aspect that would help materially in reducing the first cost is the amount of flight testing necessary to meet I.C.A.O. requirements ; this, as most manufacturers will agree, is a long and very expensive business, all of which is reflected in the selling price, and any amelioration (without sacrifice of operating standards, of course) will tend greatly to help sales.

Summing up, the need in air transport to-day is for simplification and specialization, particularly for this class of traffic. This simplification concerns not only the aircraft, but also traffic, operational and administrative services, as costs (though not efficiency) simply must be reduced if it is to become the *accepted* means of carriage of goods ; and the first thing to do is to provide the prospective operator with a vehicle that gives him a reasonable chance of successful and profitable operation. I hope this humble contribution may serve to arouse a wider interest in a most important and vital aspect of our aeronautical economy

As one of our French friends says : "Tant que l'aviation sera une école de courage, elle ne sera pas un moyen de transport."

How very true.

BRISTOL DIRECTORSHIP

THE appointment is announced of Mr. Brian Davidson, B.A., to the Board of the Bristol Aeroplane Co., Ltd. He was appointed business manager in December, 1946, and in early 1947 became a director of the Bristol Aeroplane Co. (Housing), Ltd. Mr. Davidson has had a distinguished scholastic and professional career. Born in 1910, he was educated at Winchester and New College, Oxford, where he took a first in Moderations and a second in Greats. In 1933 he was called to the Bar and for some years was in practice with Sir Walter Monckton, K.C. ; in 1939 he qualified as a solicitor. During the war he held posts in the Air Ministry and M.A.P. He was seconded for special planning duties in connection with the expansion of Bomber Command, and later became Chief Administrative Officer (Engines). He joined the Bristol Company in July, 1943, as divisional secretary of the Engines Division, a post which he occupied until, as mentioned above, he became business manager.

Mr. Brian Davidson

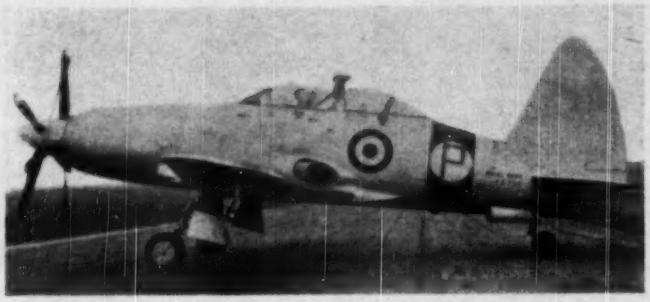
AERO CLUB BALL

LORD and Lady Brabazon received the guests at the Royal Aero Club Ball, held at Londonderry House on Wednesday, March 8th, for it was to celebrate the fortieth anniversary of the issue of a pilot's licence—the first in this country—to Lord Brabazon that the Ball was held. After recalling the event, Lord Brabazon remarked on the tremendous progress the Royal Aero Club had made during the past forty years, and he congratulated Capt. Lamplugh and the ball committee on a remarkable function. He said it did his heart good to see what a live and wonderful body the Club had become.

For many people a highly successful function took on the nature of a reunion, for a good proportion of the 500 or more who attended were active flying-club members who had not met since the races and rallies of the end of last summer. One could but sympathize with the few guests who had no interest in flying, for on all sides was to be heard the talk of the enthusiast. Incidentally, it is very gratifying, though not surprising, that all indications at this stage are of exceptionally good support of the year's air races and other events.

Good organization and admirable use of the delightful amenities of Londonderry House helped to make the ball an occasion which all will wish to repeat.

HERE and THERE



ROOM FOR TWO : First photograph of the Westland Wyvern T.3—a dual-control training version of the Mk. 2 strike fighter. Both types are powered by the Armstrong-Siddeley Python turboprop. A periscopic mirror for the instructor, who occupies the rear seat, is fitted between the canopies, and ejector seats are carried.

First Flight

THE Fokker S-13 crew trainer made a successful maiden flight at Amsterdam on Saturday. Powered by two 600 h.p. Pratt and Whitney Wasp radial engines, the S-13 is designed for the advanced training of pilots, navigators, signallers and bomb aimers.

Aerocade "Off"

THE A.B.A.C. "Easter Aerocade" has been indefinitely postponed. Further details appear on p. 357.

"Fido" Claims

DURING next week the Royal Commission on Awards to Inventors is to consider a number of claims respecting the development of "Fido"—the system of dispersing fog on airfields. The Secretary of the Commission is to be available in his room at Somerset House, London, W.C.2, at 10.30 a.m. today, March 16th, to give preliminary information concerning the claims.

Far Horizon

THE crew of a Viking flying recently at 10,500ft over Nevers, 135 miles south of Paris, sighted the peaks of the Pyrenees, some 300 miles distant. Ground-mist prevailed during this period of exceptional visibility. The Viking was operating on the leave-service run by Airwork for the Sudan Government, and was piloted by Capt. McLeod. Sir Archibald Hope, manager of Airwork's charter division, and Capt. Woolte, the firm's operations manager at Blackbushe, who were on board, confirmed the pilot's identification of the mountains.

One that Didn't Get Away

A PRIVATE aircraft worth £1,600 was confiscated recently in Quebec after its occupants had used it as transport for a fishing expedition on which 35 lb of speckled trout were taken illegally. In addition, each defendant was fined a sum of £32.

Pint-size Pilot Pickled

THE body of "a 23in-high man, found in a flying-saucer which crashed on a Mexican hillside three months ago," has—according to a recent American report—been embalmed for scientific research. Two motors, about 40ft in diameter, were said to have powered the machine, which was constructed of "tremendously hard metal."

Despite the recent statement that nearly 1,000 "saucer" stories investigated by the U.S.A.F. had proved to be without foundation, the subject appears to have revived itself as strongly as before. Last week came a Geneva report that saucers circled the Jura mountains for an hour, while, in America, jet fighters were said to have chased flying saucers, only to lose contact at 37,000ft.

Navigation Displayed

CHARTS plotted by Mr. Francis Chichester during his classic solo flight across the Tasman Sea from Auckland to Sydney, in 1931, are among the aeronautical items in a "Navigation through the Ages" exhibition now being held in Oslo. Also shown are cloud-and-collision warning radar, a G.C.A. model and photographs taken during the 1945 Polar flight of the Lancaster *Aries*, together with sections of the navigator's log. The exhibition, which is open until April 4th, is being presented by the British Council and other bodies.

Skyknight Tanks

IN a recent issue of *Aviation Week*, Mr. E. H. Heinemann, chief engineer of the Douglas El Segundo plant, states that, in the design of the F3D Skyknight naval night fighter, considerable thought was given to the installation of wing-tip tanks. They were not utilized because of the problem of obtaining lateral control with one tank empty; increase in wing weight, resulting from landing loads with tanks full; complications of folding the wings with full tanks; and the problem of filling tanks with the wings folded.

Thus, the Skyknight appears to have been severely penalized by the wing-folding requirement, for the Northrop Scorpion night fighter, designed for the U.S.A.F., is flying with large-capacity tip tanks.

Stratojet Production

THE first production model of the Boeing Stratojet was completed on March 1st. Designated B-47A, it has more powerful turbojets (six 5,200-lb thrust J-47s instead of 4,000-lb thrust J-35s) and greater fuel capacity than the first prototype. The Boeing Company has worked on the design and development of jet bombers for over six years, and first flew the Stratojet in December, 1947. Only one type of jet bomber is in full squadron service with the U.S.A.F.—the North American B-45 Tornado.

Less Plain Fare

THE R.A.F. station at Gatow, Berlin, which was the world's busiest airport at the time of the Air Lift, now maintains one of the largest farms in the R.A.F. Last year the sales of produce

EVE OF DEPARTURE : As the winner of an essay competition organized by the Women's Junior Air Corps, Miss Doreen Pennell (left) last week began a two-month air tour of Australia. At a London reception Air Marshal Sir John Slessor, Lady Slessor and Viscountess Leverhulme (right) wished her *bon voyage*.

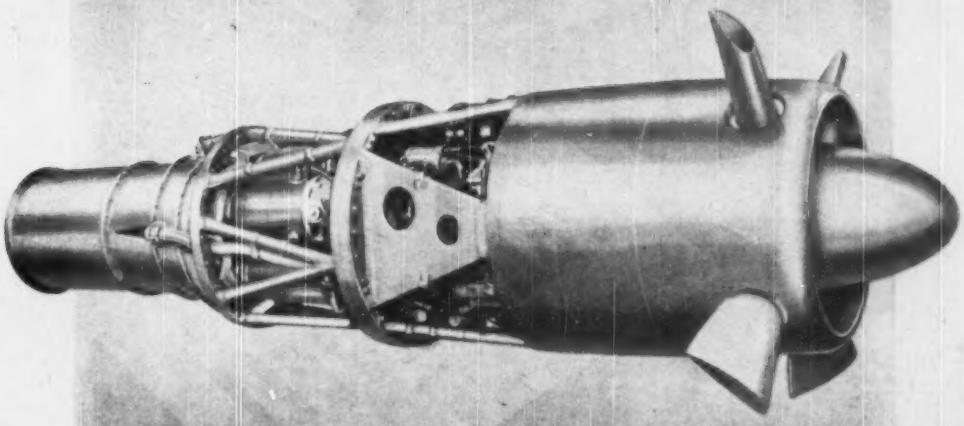
NAPIER NAIAD

PROPELLER TURBINE ENGINE

TOTAL [illegible] H.P. – [illegible]

WEIGHT – 1095 LBS.

DIAMETER – 28 INCHES



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HERE AND THERE . . .

from the farm realised more than £1,500 for the station's Service Institute. Over 50 acres are under cultivation, and this year's crops will include potatoes, rye, oats and beet. It is also intended to establish pig and poultry sections.

Indian Air Rally

AEROBATICS by Vampires of the R.I.A.F. were among the events at India's first national air rally, held at Barrackpore, Calcutta, on February 24th-26th. Two air races were also staged in conjunction with the rally. The first, from Delhi to Calcutta (910 miles) with an overnight halt, was won by Capt. Namjoshi (Piper Cub); Mr. V. Edmiston (Stinson L-5) and F/L. C. B. Contractor (Tiger Moth) were second and third respectively.

The second race, held at Barrackpore, was flown round three laps of a triangular course, totalling 342 miles. Miss Prem Mather, in a Luscombe Silvaire, was first; second and third were Mr. M. S. Pujji (Stinson L-5) and Mr. S. K. Bose (Beechcraft Bonanza).

FIRST INNINGS: Mr. Aidan Crawley, a former Kent cricketer, who has—as was recorded last week—been appointed Under-Secretary of State for Air.

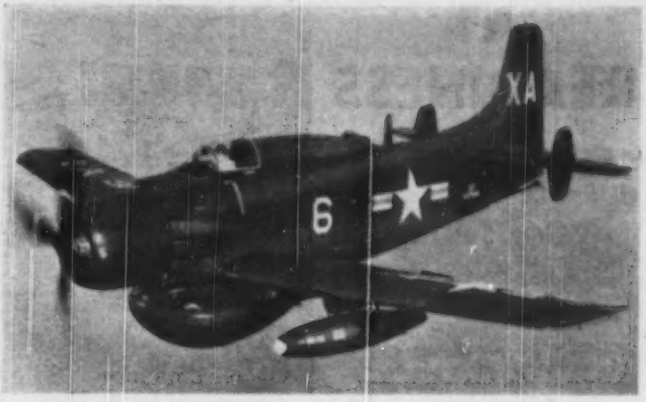
1950 Hiller 360

HILLER HELICOPTERS announce that their 1950 Hiller 360 will offer a payload increase of 150 lb, improved performance, and greater controllability. These features are made possible by detail modifications to the Franklin engine, which enable it to develop 182 h.p., aerodynamically cleaner rotor blades, and an aerodynamically faired Rotormatic control.

The new helicopter will be available in utility or executive transport form costing £7,670 and £8,560 respectively. The former price of utility models—£7,140—will remain effective until April 15th.

On Official Business

ACCORDING to a recent survey, U.S. Government departments operate a total of over 1,000 aircraft, exclusive of Service machines. Duties undertaken by this sizeable force include personnel transport, pest control, survey, security and border patrol, fire-fighting and enforcement of fish and game laws. The Department of Defence has the largest number of aircraft (760), while the State Department is at the other end of the scale, with two aircraft—used by the American air attachés in London and Rio de Janeiro.



RELIEVING THE PILOT: As originally designed and put into full squadron service, the Douglas Skyraider strike aircraft is a single-seater. The latest versions, however, carry comprehensive radar equipment and are therefore provided with a second crew-member. The Skyraider illustrated is the AD-3W, for weather-scout duties.

Export Enterprise

EARLY next month, Elliots of Newbury, Ltd., intend to create a precedent in aircraft export methods by air-towing three Eon Olympia sailplanes on delivery to Denmark. At the same time, the Verviers Club, of Spa, Belgium, are to take delivery of another Olympia, also by air.

R.Ae.S. Associate Fellows

THERE were nearly 150 successful candidates in the December, 1949, examination for Associate Fellowship of the Royal Aeronautical Society. The Baden Powell Memorial Prize, awarded to the best candidate in the entry, was won by Mr. B. E. Boyce, of Coulsdon, Surrey.

NEWS IN BRIEF

THE Royal Aero Club is to hold its annual general meeting at 119, Piccadilly, on March 23rd, commencing at 6 p.m.

* * *

Nearly 600 guests attended the first post-war dance and cabaret held by the Exide Manchester depot.

* * *

Short Brothers and Harland, Ltd., have published the first issue of a well-produced house journal. Entitled *Short's Quarterly Review*, it will be primarily devoted to "propagating the cause of the flying boat."

* * *

A party of officers from No. 12 Combined Technical Course at R.A.F. Henlow recently visited the Chadderton and Woodford factories of A. V. Roe and Co., Ltd. At Woodford they heard a talk on "Aircraft Weight Control" by Mr. Frank Howarth, chief weight engineer on the design staff.

* * *

Completely restyled, and enlarged in size, the March issue of *Mechanical Handling* contains full advance details of the Mechanical Handling Exhibition and Convention (Olympia, June 6th-17th) organized by the journal. The Convention programme which it contains includes a list of the papers which will be read by well-known industrialists at the 17 meetings.

* * *

Blackburn and General Aircraft, Ltd., announce the removal of their London office to 43, Berkeley Square, W.1 (Grosvenor 5771-8). As a result of the closing-down of the Feltham factory, Mr. H. V. Gort, joint managing director, and his administrative staff will move to the new address. A Southern Design and Project Office has been established at Hanworth Aerodrome, Middlesex (Feltham 4031-4), where Mr. F. F. Crocombe will have his principal offices. The head office and factory remain, of course, at Brough, East Yorkshire.

* * *

Avica Equipment, Ltd. (formerly Aviation Corporation), 50, Pall Mall, London, S.W.1, have formed an electrical division which will represent the St. Helens Cable and Rubber Co., Ltd., for sales of aircraft and other cables.

* * *

After a dispute over new piecework bonus rates in the assembly shops, which involved a stoppage at the Hatfield works and Welwyn (sheet-metal) factory of the de Havilland Aircraft Co., Ltd., work was resumed on March 6th. Negotiations for a final settlement followed the resumption.

* * *

Edited by Jacques Cochemé, A.F.C. (whose articles on gliding and meteorology have appeared in *Flight*), in conjunction with Philip Wills, C.B.E., and Ann Douglas, an informative new quarterly has recently appeared under the title of *Gliding*. It is published by another gliding expert, John Hurry, at 17, Great Queen Street, London, W.C.2.

* * *

A payment of £160,000 has been made by the Crown to Aluminite and Alzak, Ltd., for the war-time development of anodizing and other processes for the protection of aircraft and other light-alloy components.—The award was made without reference to the Royal Commission on Awards to Inventors. The processes, it is stated, obviated the use of chromic acid, which was an import difficult to obtain.

AT READINESS

Successful Week-end Rally of Regular and Auxiliary Fighter Squadrons

Illustrated by "Flight" Photographs

Spitfire 22 pilots of No. 613 (City of Manchester) Squadron discuss the exercises in an interval between sorties. Meteors of Regular Horsham St. Faith squadrons are in the background.

IN these austere days the concentration of nine fighter squadrons on one R.A.F. airfield is a spectacle guaranteed to gladden the hearts of the air-minded. Such was the reassuring scene at Horsham St. Faith last Saturday, when practically a quarter of the flying squadrons of the Royal Auxiliary Air Force arrived for a week-end of work with the resident Meteor units.

Just after lunch on Saturday the station stood quiet but expectant—as the visitors were awaited. Then, for an hour, came an almost continuous stream of fighters. From the circuit there was first the sound of Meteors, already familiar in the district; the shriller, eager whistle of Vampires; then the familiar crackle as Spitfires began their approach. Sadly, it must be confessed that even the sleekest "Spit." seems to have lost some of its fire in a meeting mainly jet-powered. The last arrivals had a more stately and ponderous note; two Hastings and a York transporting Auxiliary ground crews to Horsham.

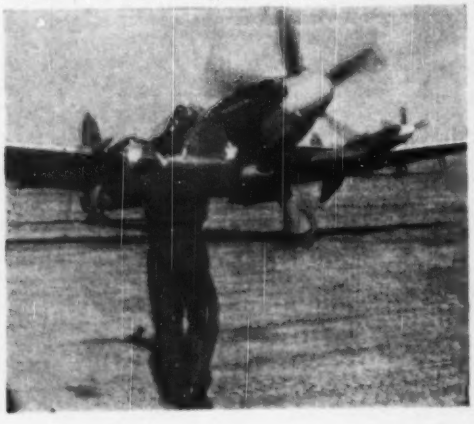
There were five visiting units. Fifteen Spitfire 22s represented Nos. 610 (County of Chester) and 613 (City of Manchester) Squadrons; four Vampire 1s were supplied by 605 (County of Warwick) Squadron; 616 (South Yorks) Squadron brought six Meteor 3s and one "7," and 504 (County of Nottingham) Squadron, the first Auxiliary unit to receive Meteor 4s, had a representation of five aircraft.

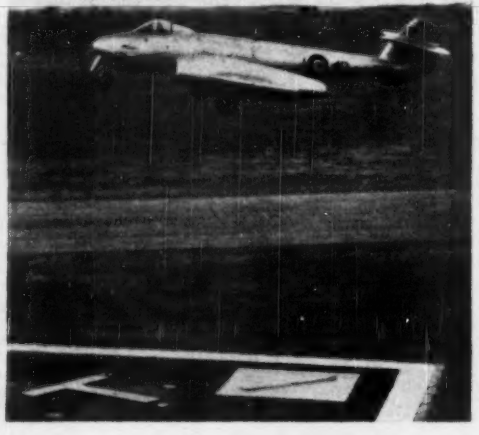
Assembled, the visiting pilots were warmly welcomed by the Station Commander, G/C. K.B.B. Cross, C.B.E., D.S.O., D.F.C. Then began a thorough briefing of all taking part, Regular and Auxiliary, in the next day's intensive exercises.

Despite the title "Auxiliary," the week-end squadrons are part of Britain's front-line air defence, and in war must immediately assume equal combatant status alongside the Regular component. This can only be made possible by the most thorough use of available training hours, in addition to deep personal enthusiasm. A logical step was taken last summer, therefore, when the 20 Auxiliary fighter squadrons were integrated with Fighter Command. More recently, each Auxiliary squadron has been affiliated to a Regular counterpart. Normally, two R.Aux.A.F. units are teamed with one R.A.F. squadron.

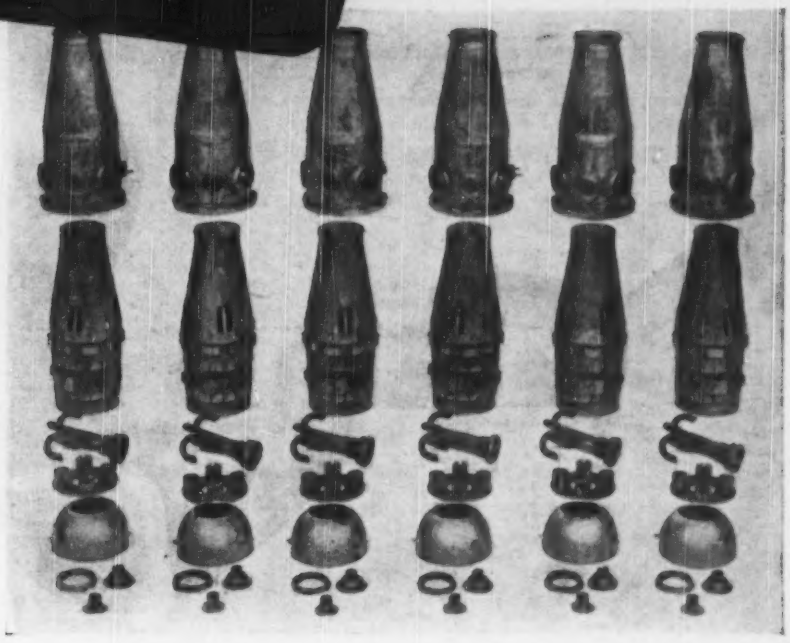
By visiting, once a month, the base of its affiliated unit, a week-end squadron has the opportunity of using radar control, radio and airfield facilities not available at its own parent station. Furthermore, its members will quickly become conversant with current Service operational technique and meet with their Regular comrades.

During Sunday morning, F/L. Lynes provided an exceptional display of Meteoric antics. His aircraft (right) is seen below control-tower level. (Below) Auxiliary groundcrews had a hectic week-end servicing, refuelling and marshalling their aircraft. Spitfire 22s are shown.





500 hours
AT INTENSE HEAT
and still sound



These combustion chambers of Nimonic 75 were taken from an Armstrong Siddeley Mamba engine after the completion of a 500-hour test. They have been re-assembled and again placed in service. Nimonic 75 and Nimonic 75F are two of a series of nickel-chromium alloys, developed originally to meet the exacting demands of the aircraft gas turbine. They provide the solution to many engineering problems where strength and resistance to heat and oxidation at high temperatures are essential.

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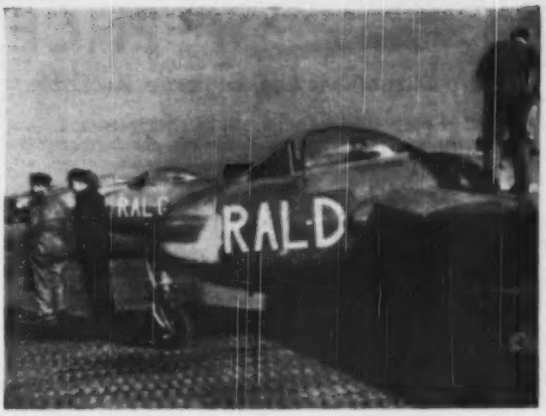
AT READINESS . . .

At Horsham St. Faith, the first of such visits was made a few weeks ago, followed by this second series of exercises last Sunday, which repeated the operational theme.

A security ban precludes identification of the Meteor squadrons lodged at Horsham, but the names of their commanding officers will be familiar to many readers. The squadrons commanded by S/L. Pitt-Brown, D.F.C., and S/L. Randle, D.F.C., were first airborne early on Sunday morning. For the benefit of 504 and 605 Squadrons, they acted as jet-bomber targets twice during the day. The two Spitfire squadrons, 610 and 613, were, in effect, airscrew-driven outcasts. The wide margin in speed and climbing power made impracticable co-operation between the two generations of fighter types. Nevertheless, the Spitfires of both units (acting, in turns as interceptors) demonstrated most efficiently within their capabilities.

A third Horsham Squadron is commanded by a U.S.A.F. officer, Major Garner, who is with the R.A.F. under the exchange scheme. Two of the Horsham pilots, incidentally, are now flying F-86 Sabres in the States. Major Garner's squadron twice flew as targets for the Meteor 3s of 616 Squadron, and a fourth Regular unit, under S/L. Innis, D.F.C., was also in action.

For the occasion, weather was perfect: a brilliant sun, and sufficient cloud to give realism to ground-controlled interceptions. Almost every defending force attacked its quarry successfully at heights up to 28,000ft, and commanders were extremely satisfied with practice gained and lessons learned. The success of the occasion was, perhaps, best expressed in the exuberant aerobatics of F/L. Lynes, the Regular pilot detailed to demonstrate the Meteor 4, by way of signing-off the exercises. His manœuvres ranged from an inverted climb-away after "wheels-up" to a neat landing on the perimeter-track.



Four Vampires 1s, from No. 605 (County of Warwick) Squadron, were the sole representatives of their type in the exercises at Horsham St. Faith.

PRODUCTION CUTS

Manufacturers' Protest to Mr. Attlee—and an Uncompromising Reply

LAST week the Bristol Aeroplane Co., Ltd., and Handley Page, Ltd., made public the major points in a memorandum which they had addressed, on January 28th, to the Prime Minister, the Minister of Defence, and the Minister of Supply. Its subject was the effect which the Government's recent economy cuts are likely to have on the Services and the aircraft industry.

In issuing their statement the two companies point out that, at the suggestion of the Government, certain passages appearing in the original memorandum have, in the national interest, been withheld from publication.

The statement begins by reviewing the circumstances in which it was issued: "It is understood from the officials of the Ministry of Supply that in view of the pressing need for reducing defence expenditure in 1950-51 it has been decided to make immediate cuts in R.A.F. Transport Command . . . cancelling immediately the greater part of the 1950-51 orders, already placed many months ago, for Handley Page Hastings and other aircraft, manufacture of which, together with their Bristol Hercules engines and all other items of equipment and accessories affecting many factories, is already well advanced.

"Representations have been made to the Ministry of Supply and to the Air Ministry regarding the consequences upon an important section of the aircraft industry of this sudden policy decision in relation to a period so immediately ahead, but while the probable consequences are acknowledged it is explained that the need for reduction in defence expenditure is a Cabinet decision, and that . . . further representation to the Departments is useless. This memorandum has therefore been submitted to emphasize with all the strength possible the dangerous consequences, direct and indirect, to the Services and to industry."

The statement then goes on to point out that sudden cancellation of the contracts concerned will involve immediate discharge of large numbers of skilled personnel—specialists who are not readily transferable to other work. Such employees, it is pointed out, form the framework upon which any necessary war expansion could be based. The accompanying dislocation would have repercussions throughout the organizations concerned. Also, it is added: "To disorganize these teams, so carefully built up over the years, is to make a travesty of the industry's efforts, so keenly encouraged by the Government, to recruit and train scientists and technicians, to provide education schemes jointly with universities and technical colleges, and generally to establish a high level of scientific and engineering capacity equal to the challenge of modern technological and scientific progress."

As regards the Service aspects, it is felt that: "A most damaging blow will be struck at the efforts of the industry and the Royal Air Force to encourage systematic recruitment of good quality young men, especially apprentices and students, into the technical branches of the industry and the Services. . . ."

Continuing, the memorandum brings in a point which has several times been made in *Flight* during the past few weeks: "The neglect of air transport operations will lead to the virtual elimination of the "know-how" and technical background to such operations, and of the continued development of specialized equipment and methods—all of which the R.A.F. learnt with such difficulty in and after the war. The case for a strong Transport Command has been demonstrated repeatedly, even in peace-time, and never more than by the Berlin air-lift. . . .

"In the circumstances, it is most earnestly submitted that the policy . . . should be re-examined in the light of the facts revealed above which may not have been fully appreciated."

The Prime Minister's Answer

The original memorandum was forwarded under cover of a letter signed by Sir Frederick Handley Page and Sir G. Stanley White, and to this Mr. Attlee replied, on February 6th, in the following terms:—

"I can assure you that the points which you have raised were fully taken into account by Ministers when the question of economies in expenditure came under consideration. While the Government are unable to continue the purchase of aircraft for which there is no longer a requirement, they are fully alive to the importance of your firms as part of the aircraft production potential to this country and as designers of important future types.

"I realize that the cessation of these particular orders must have serious effect on your firms and their employees, and I regret that in present circumstances it has not been possible to avoid this. I can say that careful consideration is being given to the possibility of alleviating these difficulties."

DEFENCE, 1950

More Money to be made Available for Research and for the R.A.F.

THE new Minister of Defence, Mr. Shinwell, presented to Parliament on Monday, March 6th, the Defence Estimates for the three Services. They were simultaneously published in a White Paper, *Statement on Defence, 1950* (H.M. Stationery Office, price 4d).

In the introduction it is stated that "until world peace can be assured by an effective system of collective security under the United Nations, it is the policy of His Majesty's Government to seek security through the development of collective self-defence . . . Defence policy is based on the assumption that we should not stand alone in resisting aggression. Co-operation and consultation with other members of the Commonwealth have always been the core of our defence policy . . . but now, in addition, specific engagements have been made with other peace-loving nations in the Brussels and North Atlantic Treaties."

It is pointed out that the defence responsibilities of the United Kingdom Government are not limited to those assumed under the Brussels and North Atlantic Treaties.

Although the numerical strength of the Forces "can be reduced," total expenditure for the next financial year will be £780 million. The main change in the use of resources is that money will be spent on equipment and research rather than on manpower. It is now planned to reduce the uniformed strength (of the three Services) to 718,800 by April 1st, 1950, and to 682,100 by April 1st, 1951—more than 100,000 below the strength a year ago. On the other hand, nearly £35 million more will be spent on equipment and research than in 1949-50.

Reference is made to the help given by a comprehensive inter-Service review of the future development of the Forces put in hand just over a year ago. "This review," says the *Statement*, "made it clear that there were no grounds for any substantial change in the relative roles of the three Services or for any drastic curtailment of the strength of any one of them." It is now believed in some quarters that this is no more than an interim finding and that there will be continuous change almost from month to month.

The allocation of the net defence budget for 1950-51 with comparative figures for 1949-50, is as follows:—

	1950-51 £m	1949-50 £m
Admiralty	193.00	189.25
War Office	299.00	304.70
Air Ministry	223.00	207.45
Ministry of Supply	65.00	37.75
Ministry of Defence	.82	.71
	780.82	759.86

On the subject of the Air Force the following broad statements are made:—

"The plan for doubling the jet-fighter strength of Fighter Command will be completed and the power of Bomber Command will be increased by forming squadrons of B-29 aircraft as a result of American aid. Other Commands, except Transport, will remain broadly at their present strength. With the gradual build-up of Bomber Command there will be a reduction in the air transport force at home but we shall retain enough transport aircraft to meet essential needs and to enable us to make an important contribution to another airlift operation should that become necessary.

"The number of men (202,400) in the Air Force on April 1st, 1950, will be about 10,000 below the planned figure, but little further change during the year is contemplated."

In fact, a small increase, probably amounting to 3,000, is expected in the Air Force during 1950-51, but it seems that in the Air Force, as in the Army, there will be a heavy wastage arising from the termination of current engagements, particularly short-service and bounty engagements. Recruitment figures for 1948 and 1949 were:—

	1948	1949
Normal Regular Engagements ..	9,900	10,300
Bounty Engagements	3,700	1,900
Total	13,600	12,200

While the Navy figures are satisfactory, those for the Army and Air Force are considerably short of requirements.

Because the full list of problems that the Services would like solved "would require a far larger part of the scientific and technical effort of the country than can be justified," the research and development programme must be limited to "those projects whose solution is most vital to our defence and seem most likely to be achieved in the not-too-distant future." The greater part of the year's expenditure on research and development will be for the Air Force, and under this heading, and on the Air Force itself, rather more than an extra £10 million will be spent. Army and Navy costs will be approximately the same as in the previous year.

In connection with regular recruitment it is stated that a high level cannot be expected unless Service conditions compete in attractiveness with those of civilian life, and one of the principal considerations is the provision of married quarters. It was to enable greater progress to be made in this connection that the Armed Forces (Housing Loans) Act was passed last year. This provides £40 million to be borrowed over the next five years, but money will be advanced only for Service quarters which are "so sited as to be suitable for civilian occupation should the Services no longer require them." Of the immediate requirement at home for 30,000 new permanent houses, a start will be made on 6,000 to 7,000 houses in 1950-51. Overseas, where the need is also very urgent, work will start on 2,000 more new quarters. It is considered extremely important to persuade men to remain in the Service after their original engagements have expired.

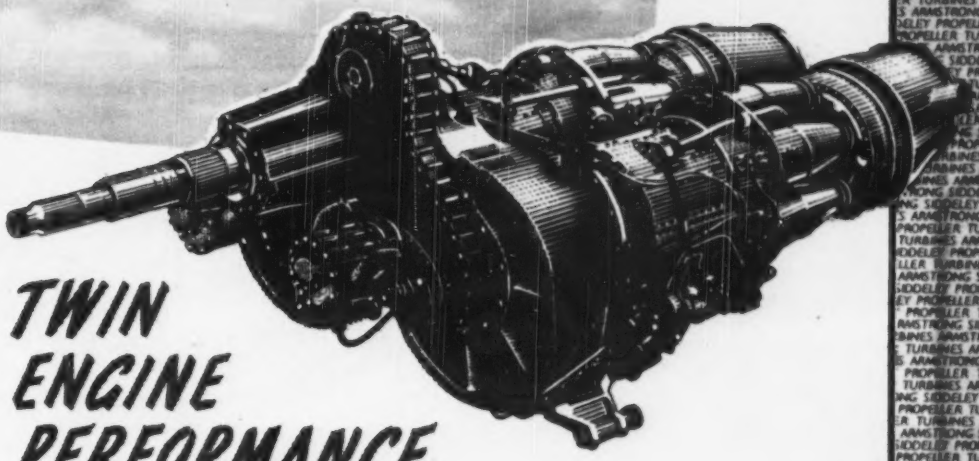
The progress that has been made in recruiting for the Volunteer Reserve and Auxiliary Forces is indicated by the following figures:—

	Strength at 1st Jan.. 1949	1950	Target
Royal Auxiliary Air Force	3,509	5,900	29,000
Royal Air Force Volunteer Reserve	4,459	8,100	38,000
Royal Naval Volunteer Reserve ..	3,241	5,150	15,000

The expansion of the R.Aux.A.F. and the R.A.F.V.R. is reported as slow, but satisfaction is expressed that the number of pilots in these Forces is almost up to requirements. Some comments on the Defence Estimates and upon the strength of the R.A.F. are made in a leading article in this issue.

HEALTHY OFFSHOOT: Over 100 members and friends were present at the recent first annual dinner of the Hatfield Branch of the Royal Aeronautical Society. De Havilland personalities here are, left to right, Mr. Martin Sharp (public relations), Mr. Harry Povey (general production manager), Mr. R. H. Clarkson, O.B.E. (chief of aerodynamics) and Mr. C. C. Walker (director and chief engineer); just visible beyond is Capt. J. Laurence Pritchard, R.Ae.S. secretary. Others present included Sir John Buchanan (R.Ae.S. president), Mr. J. E. Walker (Branch president), Mr. N. E. Rowe (vice-president), Mr. D. C. Smith (R.Ae.S. assistant secretary), Sir Geoffrey de Havilland, Mr. F. T. Hearle, Mr. W. E. Nixon and Mr. E. J. Mann.

The Double Mamba flying in the Fairey 17



TWIN ENGINE PERFORMANCE

— FROM A SINGLE INSTALLATION

The Double Mamba power unit—first of its kind in the world to fly—gives all the advantages of twin engine performance with a reduction in weight and the frontal area of a single installation. As it is possible to shut down and restart either engine independently, it provides the Fairey 17 anti-submarine aircraft with increased flight endurance and a high reserve of power.

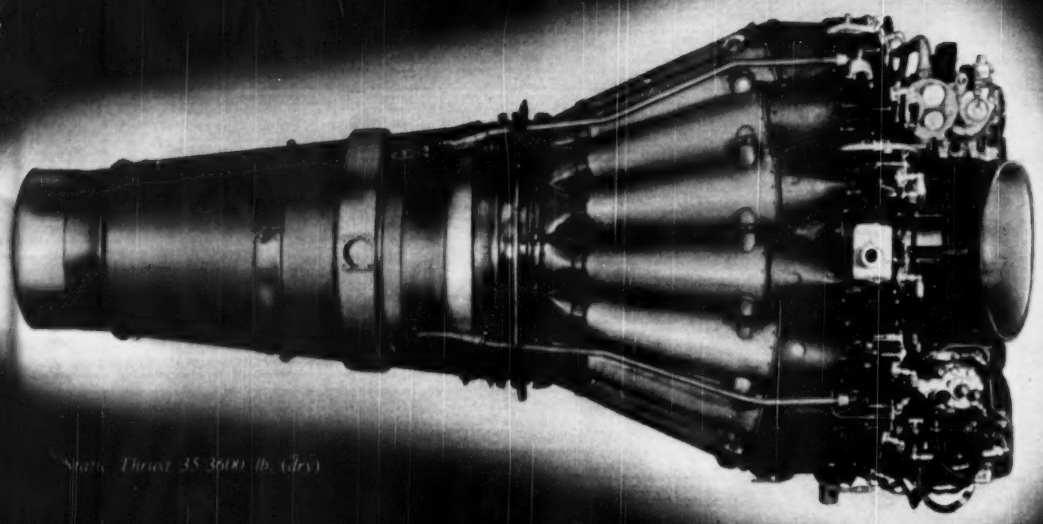
DOUBLE MAMBA

PROPELLER TURBINE

ARMSTRONG SIDDELEY MOTORS LTD

PARKSIDE COVENTRY — BRANCH OF THE HAWKER SIDDELEY GROUP

Goblin 35



Static Thrust 3,500 lb. (Dry)

The latest edition of the only gas turbine in the world basically approved for 600 hours of operation between overhauls

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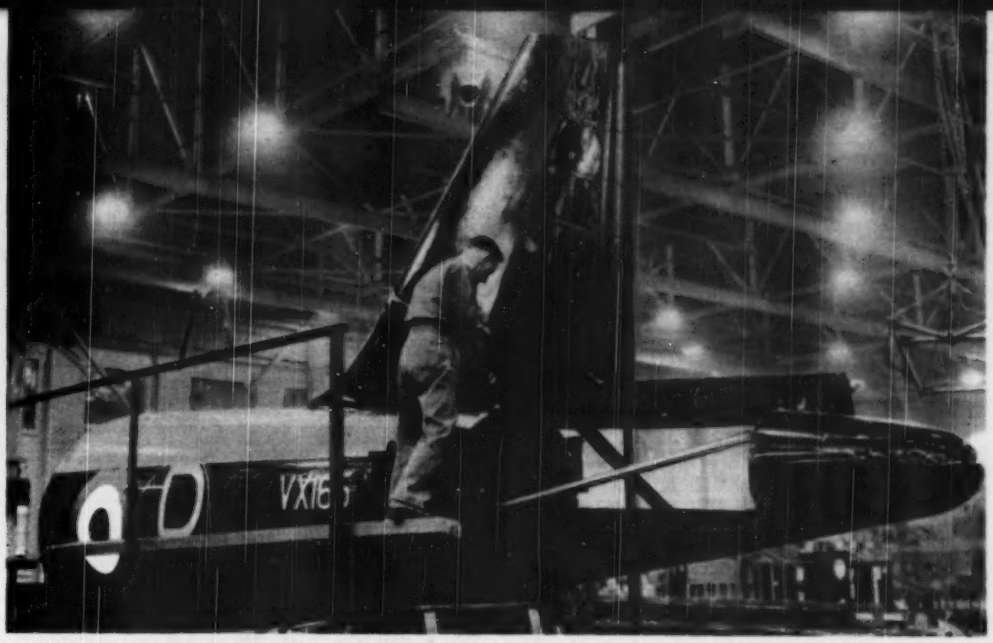


A freshly painted Canberra rear fuselage, complete with fin, and almost ready for its control surfaces and variable-incidence tailplane.

PRODUCING THE CANBERRA

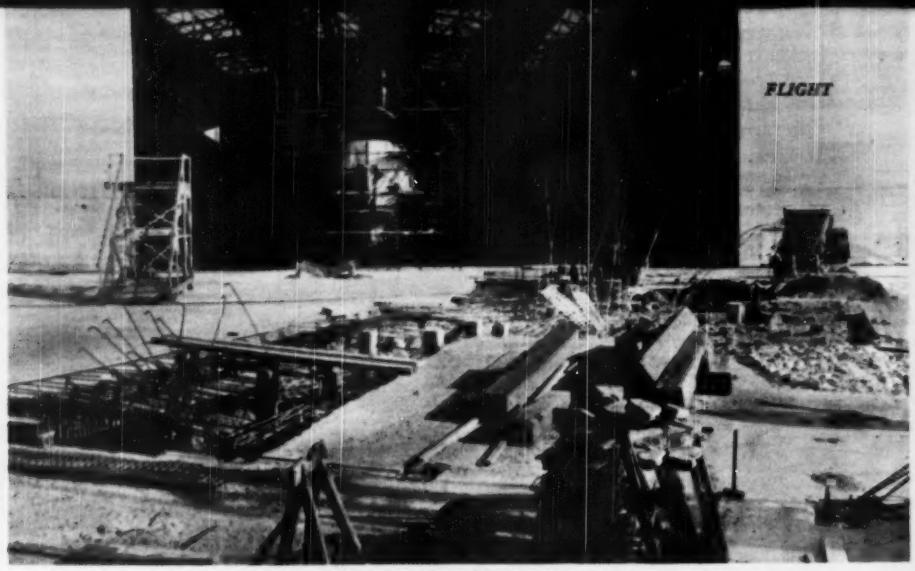
WORK on new prototypes of the English Electric Canberra jet bomber (a line-up of four was depicted in *Flight* of February 16th) is going forward at a brisk rate, easing the way for the production machines to follow. The description "prototypes", though acceptable enough in the sense that the aircraft concerned bear the distinctive ringed "P" and are earmarked for special pre-service tests, is not altogether technically correct. As pointed out in *Flight* of December 15th, 1949, when the type was fully described, even the first machine was jig-built, in accordance with the makers' reasoning that, if a finished aircraft is to perform with any close adherence to the designer's intention, it is essential that the structure should be completely accurate.

Of the new photographs reproduced here, that below is especially interesting in showing one of the unusual finger-type dive-brakes installed on top and bottom wing surfaces. These fitments are reported to have given excellent results and should prove invaluable, not only in restraining the Canberra from exceeding its high limiting Mach Number under any conditions, but in further broadening the extensive field of its military applications.

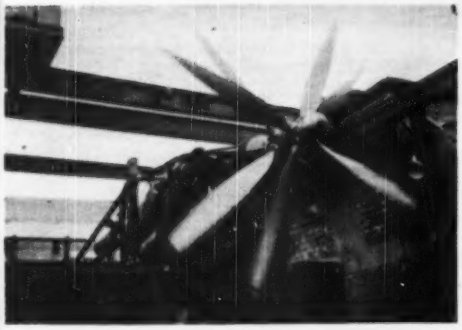
New to Bomber Command will be the Martin-Baker ejector seats, one of which is seen being slipped into place in the pressurized cockpit.

"You want the best seats—": A Martin-Baker ejector is installed.

Undercarriage leg and dive-brakes in place on a starboard wing.



Outside the Saunders-Roe erection shop at Cowes the slipway is being strengthened for the 140-ton flying boat.

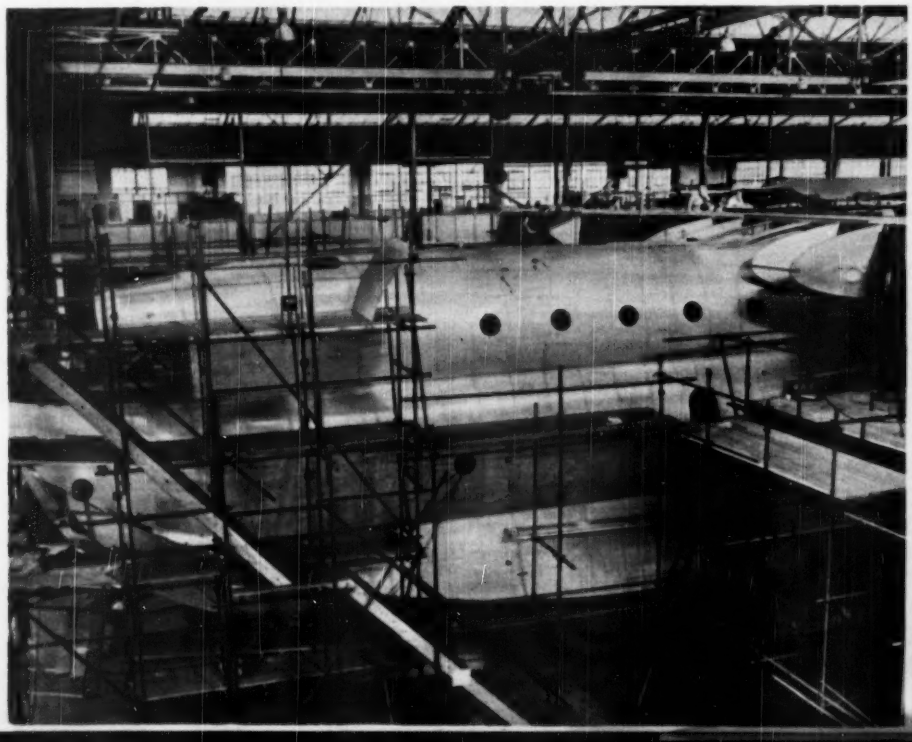


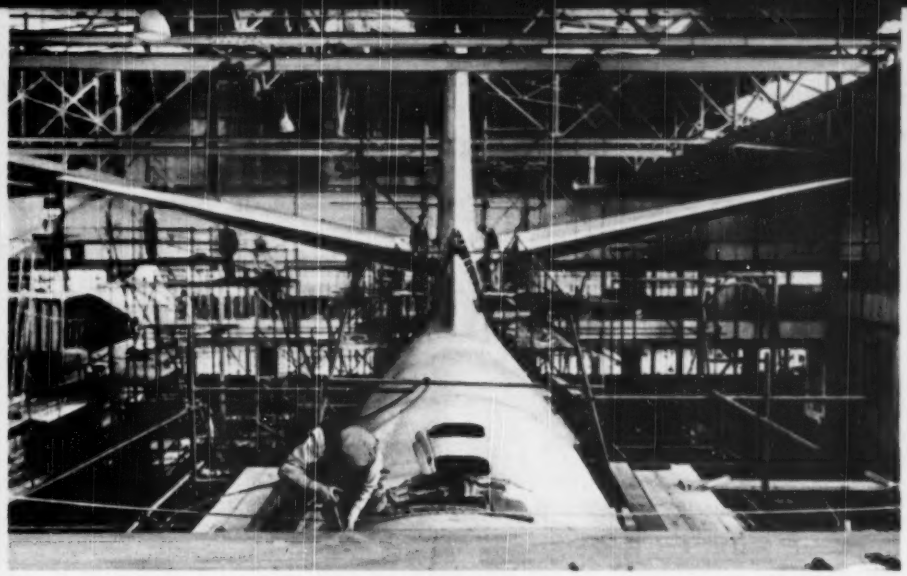
FLYING-SHIP on the STOCKS

ART and imagination have often been combined to present, in advance of the eagerly awaited launching and first flight, impressions of the stately Saunders-Roe Princess flying boats. But reality alone can give full satisfaction, and there is encouragement in the news that construction of the three Princesses proceeds according to schedule.

Last July, the hull of Princess No. 1 was withdrawn from its building stocks to permit attachment of the inner wings and main

The form of the impressive bow and "figure-eight-section" hull of Princess No. 1 is already apparent.





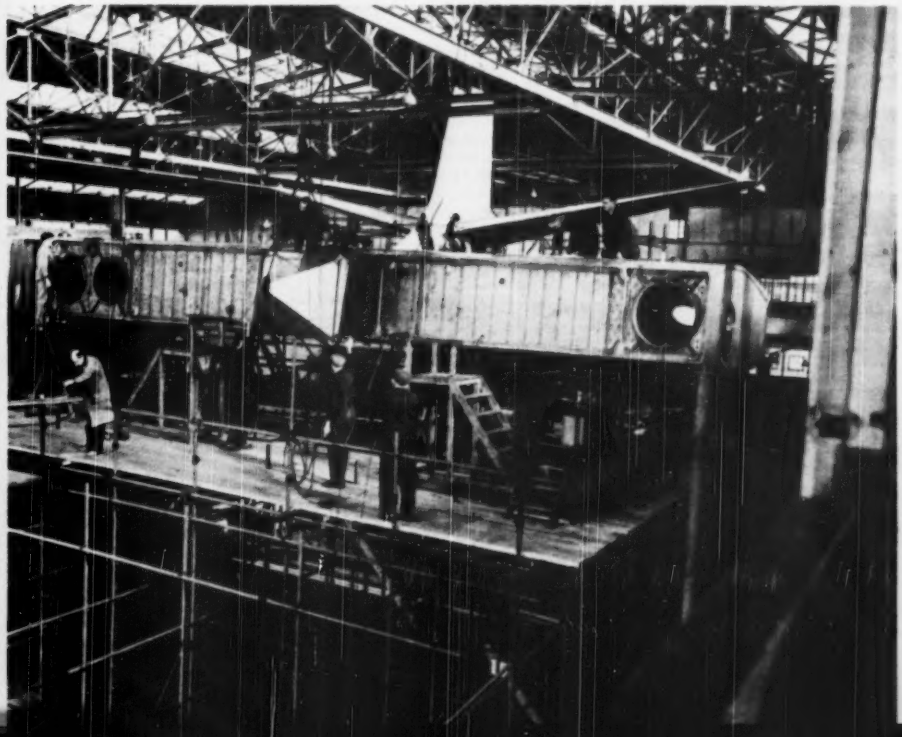
The attachment of inner wings and tail unit is the last major constructional stage inside the shop.

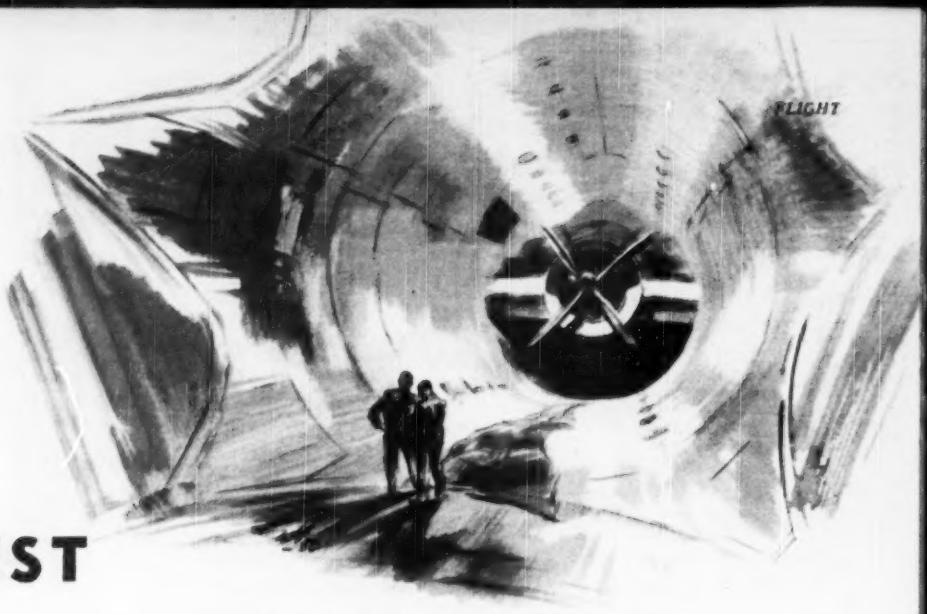
tail-unit assembly. These operations were completed on February 27th, and the accompanying pictures—impressively suggestive of ship-building rather than of aircraft construction—show the final stages of erection. Although the great hull is seen only through a lattice of staging, there are already indications of the massive grace implicit in the design and conception of the Princess.

Later this year the flying boat will move into the open and its outer wings and rudder-tip will be attached. The first flight is expected to take place in mid-1951. A target-date some six to nine months earlier was originally set, but it was announced last October that development time required for the Proteus turboprops had been extended. Delay, however, will be cut to a minimum. The Princess's powered controls are being tested in advance, in a Sunderland; dummy Proteus units will be employed for finalizing installation details; and a complete wing-section will go to Bristol's for preliminary engine-running tests. At an all-up weight of 315,000 lb, the Princess will be the largest aircraft ever built in Britain. Its dimensions are: span (floats retracted), 219ft 6in; length, 148ft; height, 55ft 9in. The newly attached dihedral tailplane itself spans 77ft. In the large view below may be seen the disposal of the ten Proteus turboprops; two "coupled" units are mounted centrally in each wing, with a single Proteus in the outboard positions. De Havilland constant-speed, quick-feathering airscrews, 16½ft in diameter, will absorb the total output of 35,000 h.p.

Cruising speed of the Princesses is estimated as 385 m.p.h. at 40,000ft. With 14,500 gallons of fuel in integral wing-tanks, maximum still-air range will be 5,500 miles. Present accommodation arrangements are for 105 passengers.

In the port inner wing-section may be seen installation positions for the ten Bristol Proteus turboprops.





The test-tunnels at Hatfield are among the most modern and advanced of their kind in existence.

QUEST for EFFICIENCY

Work of the de Havilland Propeller Company's Development Establishment

By C. B. BAILEY-WATSON

EVEN the most rabidly intolerant proponent of jet propulsion would be impressed by the activity which goes on at the de Havilland Propeller factory at Hatfield. There is no indication here that the days of the airscrew are suffering an eclipse; *par contra*, the whole atmosphere makes for the impression that the airscrew is as much in demand as ever.

That such is not in fact the case is important only in degree. Jet propulsion has undoubtedly reduced the number of airscrews required, but as a tractive system it has limitations and, consequently, airscrews are still in demand for a wide variety of applications. There is no reason to believe that jet propulsion as such will oust the airscrew for very many years yet. In some ways, the advent of the gas turbine may be said to have given the airscrew a new lease of life, for although the smaller power-units will inevitably remain of piston type for some long time to come, medium- and higher-powered prime movers are already well-established in turboprop form, and there is every indication that power installations of this type have a lengthy future ahead of them.

In view of the fact that the whole history of flight in heavier-than-air machines has, until recently, been bound up with airscrews, there is some justification for the view that, with such a wealth of background experience, the job of designing and building an airscrew should be a relatively straightforward undertaking. It is, however, far from being that. The crux of the whole matter can be given in one word—vibration; and it is toward combating the effects of this ubiquitous quality that, ultimately, the main focus of airscrew development can be said to be directed.

The original de Havilland Comet—one of which, it may be remembered, won the Mildenhall-Melbourne Race in 1934—was the first British aircraft to employ a retractable undercarriage, flaps and variable-pitch airscrews, and it was as a result of the experience with this outstanding machine that de Havillands first became actively interested in airscrews. At that time, the airscrew position in this country was by no means advanced, and rather than have to start from scratch and, consequently, have a good deal of leeway to make up, de Havillands decided to reap the benefit of American progress. In 1935, therefore, a licence agreement was negotiated with the Hamilton Standard Propeller Corporation whereby airscrews under Hamilton patents should be manufactured and sold by de Havillands. Until 1937, de Havilland airscrews were built at Stag Lane—the original home of the company—but with the general scale-up of the rearmament programme, it was decided to move the bulk of the production facilities to Lostock, near Bolton. The design and development section, however, stayed on at Stag Lane until three years ago, when it moved to Hatfield.

From the original fixed-pitch wooden airscrew with which all early aircraft were equipped, the advance of airscrew design has been literally enormous. To-day, the range of airscrews produced by the de Havilland Propeller Company embraces eleven basically different types covering a power range of from 150 to 10,000 h.p.—i.e., for the whole field of airscrew-using aircraft from the light, club- and private-owner types up to the mighty Princess flying boat—and during the life of the company to date, no fewer than 159 individual type-installations have been produced. That is to say, 159 different types of aircraft have been fitted with D.H. airscrews, but this figure is for generic types such, for example, as Spitfire and Halifax and Mosquito, and does not take into consideration the diversity of sub-types which in many instances were developed.

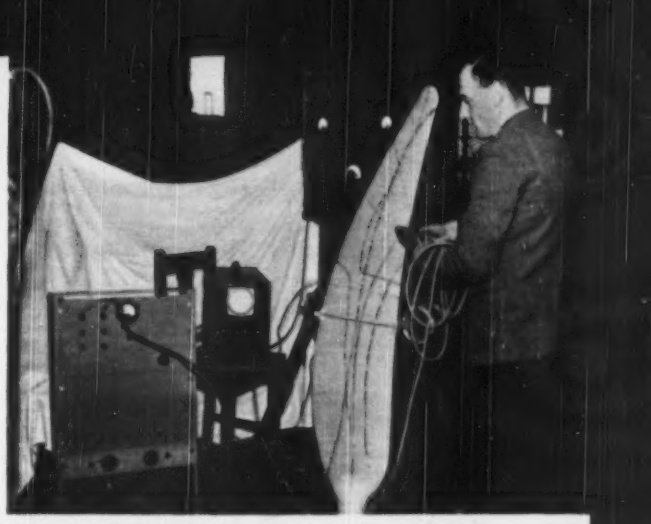
Some complementary indication of the size of the Propeller Company's interest is given by the facts that, during the past year, 1,235 airscrews were manufactured and, throughout the world, there are approximately 9,000 D.H. airscrews in day-to-day use. This latter figure is made up by some 300 operators including the Royal Air Force, Royal Navy, foreign Services and, of course, the private and commercial operators. Perhaps more impressive, *pro rata*, is the fact that 265 airscrews, including 37 contra-rotating types, were assembled at Hatfield last year purely for development purposes, and that the total running-time

of development airscrews amounted to 7,400 hours. It should, however, be pointed out that only one-sixth of this total was done at Hatfield; the intrinsic nature of development running with new airscrews in conjunction either with new engines or new airframes or both, is such that by far the greater part has to be done at the premises of the engine or aircraft manufacturer.

The airscrew manufacturer is, in fact, in a somewhat unique position. He is responsible for what is, after all, a primary component and yet the operation is dependent entirely upon ancillaries. Certainly, these are also of his own design, but they are installed and function on an engine and airframe in which the intervening system of hydraulic transmission is not under his direct control. What this means is exemplified by some of the fundamental data for which the airscrew manufacturer is dependent upon other sources, viz., shaft size, drives, mounting faces and speed of ancillaries, engine transfer-bearings and oil supply, plumbing for the feathering system, spinner, cowling lines and, of course, general space considerations which affect almost everything.

The degree of co-ordination which can be achieved between the airscrew, engine and airframe people is patently of critical importance and it must be emphasized that this does not apply only to prototype installations. The incessant striving after improvement both by engine and airframe design departments is reflected in additional demands on the airscrew constructor. The introduction of such things as alternative reduction ratios, new power ratings, changes in thrust lines and, even, fuselage lengths, can impel the need for alterations to blade form and airscrew diameter, the aim usually being the improvement of take-off and engine-out performance and the attainment of higher cruising efficiencies. The surprising thing is that even a seemingly unimportant or extraneous alteration to the engine or airframe almost inevitably entails some measure of re-design to the airscrew, and a complete repetition of the procedure for development and prototype testing, although the process may be quicker.

In general terms, the time taken to produce a new airscrew is about twelve months. At first sight, this might appear to be rather a long period, but the facts of the matter are that, although the airscrew manufacturer is told in the first instance such main parameters as airscrew diameter, engine size, aircraft weight and basic design performance, practical results cannot be established until the aircraft flies. If an entirely new engine is to be used as well, the position is aggravated because the airscrew cannot be run until the engine is received, for without the engine it is impossible to produce the engine-induced vibrations. In turn, flight trials are the only method whereby the aerodynamic vibrations, requisite changes of pitch angle, blade air-loadings and so forth can be assessed. It can, therefore, be stated that, although preliminary functional tests can be made of the several component elements of the airscrew system, much progress toward operationally acceptable finality with the airscrew cannot be made until the appropriate engine is available and, ultimately, until full-scale flight trials can be undertaken.



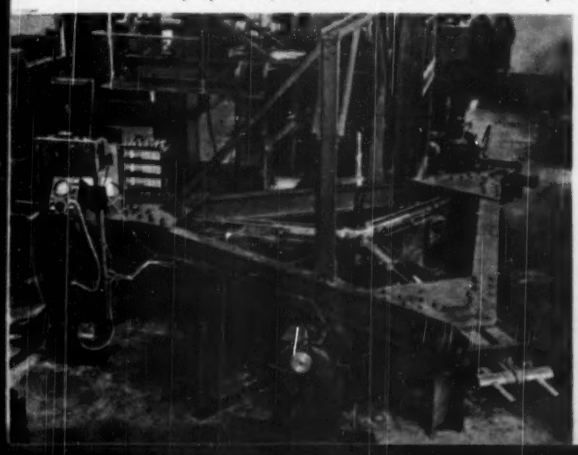
This experimental blade is being electro-magnetically vibrated and the nodal patterns investigated with a piezo-electric crystal pick-up.

Strain-gauge testing is perhaps the most vitally important single element in the airscrew development programme, and it is no exaggeration to state that, had this technique been general in the past, a very great deal of modification work which has had to be done would have been rendered unnecessary. There are so many variables: the same airscrew and the same engine installed in a different airframe can produce a whole crop of different airscrew results; for example, the long- and short-nose Vikings possess entirely different airscrew characteristics. Not only is airflow through the airscrew disc a criterion, but resonance has an extremely large part to play. If it so happens that a sympathetic resonance exists between the airframe and the airscrew—which is never known until flight trials can be made, because it cannot be calculated—then it usually happens that the airscrew suffers and has to be changed.

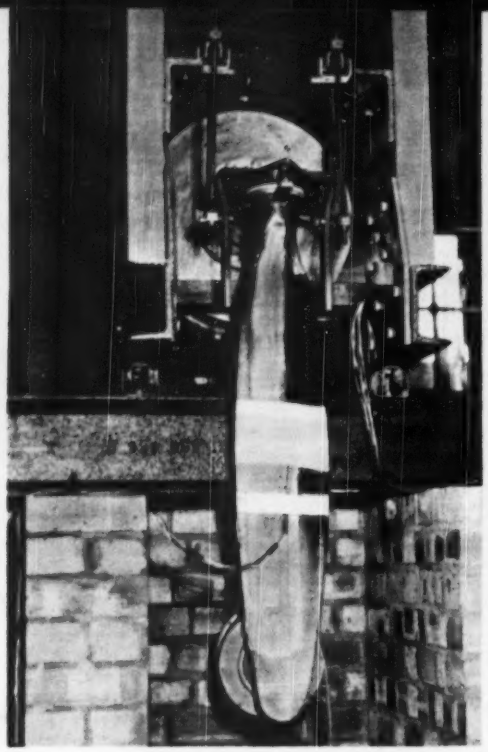
It can be stated unequivocally that, apart from striving for advances in operational performance, e.g., enhanced aerodynamic efficiency, improvement in feathering and braking functions and so forth, the main preoccupation of the development engineers is with attaining an increase in airscrew life and a reduction in weight. On these counts alone, the work of the vibration department at Hatfield is of paramount importance and therefore, before we go on to deal with the sequence of events in the final production of a prototype airscrew, there is some advantage in dwelling for a little upon the development of individual components.

The operating life of an airscrew—as distinct from its overhaul period—is almost purely a function of its fatigue-resistant properties and, of course, it is fatigue resistance which ultimately determines the acceptability of any re-design for weight reduction. It is unfortunate that fatigue resistance is an incalculable quality. Certainly, with the passage of time, the amassing of test data provides empirical generalities of some reliability, but the only method of obtaining specific answers is to undertake full-scale "questioning."

Hub vibration-rig. Centrifugal force and air-load-bending are simulated by hydraulic-jack-induced tension of the steel ropes.



Torsional characteristics are investigated on this rig, the airscrew being mounted outside the laboratory for reasons of tip clearance.



Blade fatigue test. Excited by a moving-coil vibrator, the blade is subjected to 500 million reversals with continuous monitoring.

QUEST for EFFICIENCY . . .

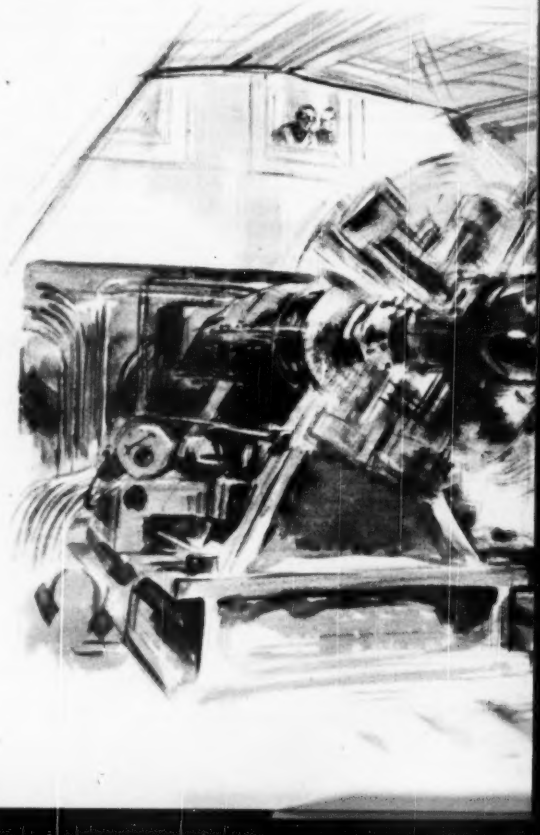
The inquisitors of the vibration laboratory make use of vibration rigs of various kinds and, in conjunction with these, the extensive use of strain gauges permits a detailed picture to be obtained of the stress distribution and magnitude. Blades, for example, are vibrated in a battery of six brick-walled wells, each of which is capable of taking a blade up to 10ft in length. The blade is hung downward from a stirrup-yoke anchored over the root, and a connecting rod from the stirrup-head is coupled to an electromagnetic, moving-coil vibrator, so that the blade is vibrated substantially at right angles to its mean chord, that is to say, normal to the plane of rotation. Mounted close behind the blade toward the tip is a pick-up unit (microphone) which senses the tip vibration and accordingly transmits a signal which is fed into the power amplifier of the vibrator. In this way, a regenerative feed-back circuit is established whereby resonance-locking is obtained. Knowledge of the particular use for which the blade has been designed means that some close approximation to the main frequencies involved can be made and, accordingly, the apparatus is set to produce the required amplitude in the required mode of vibration. The usual range of frequencies lies between 80 and 140 cyc/sec and the normal duration of a fatigue test investigation is 500 million reversals—therefore, at 100 cyc/sec 24 hours per day, the test would continue for 58 days. Strain gauges at strategic points on the blade transmit to a cathode oscilloscope stress-measuring unit which continuously and automatically records and monitors the stresses.

For vibrating blades edgewise, i.e., substantially in the plane of rotation, the laboratory is furnished with four test-rigs. Blades are mounted two at a time (purely for balance) in opposite ends of a cylinder, being retained therein in a similar fashion to that used in the appropriate hub. In the bore of the cylinder are two free pistons, the outer faces of which each bear against a dolly transferring thrust to a duralumin plug in the taper bore of the blade root. Hydraulic pressure fed into the cylinder, by forcing the piston-dolly-plug outward, can thus simulate centrifugal loading on the blade root and means of retention. By itself, this can be considered as a steady stress loading, but for the fatigue-testing of the blade root, vibration stress must also be reproduced. A mechanical out-of-balance vibrator employing eccentric bobweights is therefore attached below the centre of the cylinder, with a cardan-shaft drive from a variable-speed electric motor, the cylinder being suspended by loops of elastic cord. Here again, stress distribution and loading are sensed by strain gauges and, too, the normal test duration is 500×10^6 cycles —or, of course, prior failure.

A somewhat similar rig system is used for the testing of three- and four-blade airscrew hubs. Dummy blade-shanks are retained in the hub barrels by a means precisely similar to that used for the true blades. High-tensile-steel pins pierce the dummy-blade shanks at right angles to the blade axis, but the pins are offset slightly from that axis in order to simulate air-load bending forces. Flexible steel ropes wrapped round the pins act as tension members for the simulation of centrifugal force, the tension being derived from a hydraulic jack giving 50 tons pull per blade on the three-blade rig, and 100 tons pull per blade on the larger four-blade rig. On each of these rigs, use is similarly made of an eccentric bobweight vibrator unit and, as in the previously quoted example, the supporting medium is elastic cord. Both the hub rigs have a capacity of excitation forces up to approximately half a ton, and the normal practice is to run at a resonant frequency so that, for a required vibratory force, the power input is diminished.

The rig for torsional fatigue-testing is extremely interesting, for it enables the requisite torsional modes of vibration to be reproduced without rotating the airscrew. The hub is mounted on an arbor which is flange-bolted to one end of a tubular shaft. At the opposite end of the shaft is bolted a gearbox in which eccentric bobweights are rotated in opposite directions from a bevel gear coupled

Shown here on the universal spin-rig, the hubs of a contra-prop for the Prince trials. Offset weights on the dummy blade-shanks simulate both centrifugal fo



to the cardan shaft from a 15 h.p. variable-speed electric motor. As the bobweights rotate, their out-of-balance moments produce an alternately sympathetic and antipathic reaction upon the gearbox, and this reaction is directly transmitted, via the tubular shaft, to the airscrew. The frequency used is normally of the order of 80 cyc/sec. A somewhat similar rig is used for the determination of torsional characteristics, but the method of inducing the vibration is different in that an epicyclic gear is used with eccentric bobweights on the planet pinions. Frequencies of approximately 230 cyc/sec can be obtained. In order that the largest airscrews can be accommodated, although the main body of the rig is, of course, inside the shop, the mounting shaft pierces the wall and the airscrew to be tested is mounted outside.

In addition to the various test-rigs described, there are, in the laboratory, a variety of general-purpose rigs for the fatigue-testing and vibration-characteristic determination of components and small sub-assemblies. An interesting example of one of these smaller test units is a vibrating table: essentially, it comprises an electromagnetic vibrator connected to a spring-mounted table-top. Objects on the table can be "bounced" at about 90 cyc/sec and accelerations up to 80 *g* induced.

In concluding this brief dilation upon the work and equipment of the vibration laboratory, it must be stated that, not only does the department make all of its own strain gauges but, indeed, it makes virtually all the scientific equipment used, simply because no one else in this country manufactures suitable equipment for the work. It is, in fact, as a result of its eminence in this highly specialized field that the laboratory has, from time to time, been called upon to undertake work in connection with marine, automobile and structural engineering.

One of the latest pieces of equipment which has been designed and built by the department is an electrical linear-computor which is capable of solving twelve simultaneous equations in twelve variables. The process of computing the vibratory characteristics of an airscrew blade from drawings is both complex and tedious in the extreme, and whereas manually it takes virtually months to produce the requisite answers, it is expected that, by means of the computor, the whole process will take not more than a week. It should be emphasized in this connection that the calculator is in no way a substitute for vibration testing; it will merely permit the nodal points for known orders of vibration to be calculated expeditiously but, as already pointed out, stress loadings as such cannot be calculated; they must be determined by test.

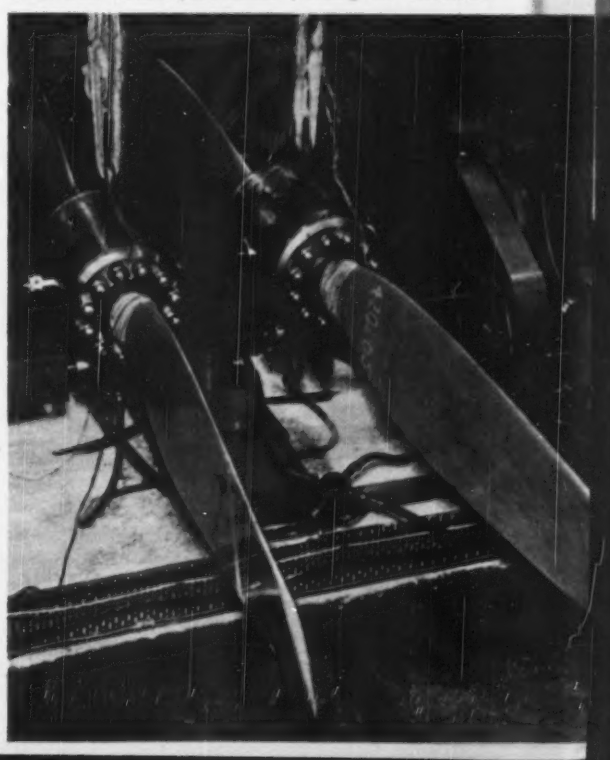
The production of an entirely new airscrew entails (i) a general design-study including aerodynamic and stress investigation; (ii) specific research and development of major components and assemblies; (iii) manufacture of prototype equipment; (iv) development and approval testing, including prototype flight trials, and (v) clearance to production. The extent of initial development depends upon the preliminary results obtained, but can be likened to an abridged form of the final approval test, the main requirements for which are mandatory and are appropriately laid down both by the Ministry of Supply and/or the Air Registration Board.

Strain-gauge set-up for flight trials of the Hermes IV airscrew.

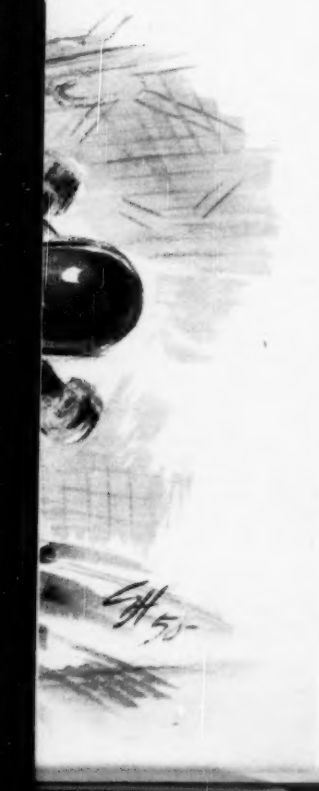
The airscrew, the fan (if fitted), the spinner and de-icing gear are given their initial spin tests at R.A.E., Farnborough, electric motors being used to spin the units at speeds 10 and 25 per cent above the maximum r.p.m. of the engine to be used. These tests are made for periods of 30 minutes at various blade pitch-angle settings, the purpose being to confirm that there is adequate strength in blade retention, that there is no excessive blade flutter and that the spinner, fan, and so forth can withstand over-speeding without distortion or collapse.

Having established that the airscrew is structurally and functionally sound, the next stage is a strain-gauge test of the airscrew assembly on the engine for which it has been designed, and this can take place on the test-beds

Blade-root loads are measured on this rig, with hydraulic pressure in the cylinders simulating c.f. and eccentric bobweights driven from variable-speed motors providing the excitation.



lying-boat are undergoing spinning
and centrifugal twisting moment.



QUEST for EFFICIENCY . . .

of the engine manufacturer, or in the modern, well-designed test-tunnels at Hatfield. It is justifiable to regard this as a major stage in the development of the airscrew, in that the object is to establish the magnitude and frequency of the vibratory stresses induced from the engine or the surrounding environment. Smothered in strain gauges, the airscrew is run over the complete speed range in positive and reverse pitch, the recordings from the strain gauges being taken, *via* a slip-ring "pineapple" mounted in front of the hub, to cathode-oscillograph equipment.

The duration of the test generally varies between five and ten hours according to the extent of checking required. In the event of the stresses being excessive, it is sometimes possible—depending upon the order, amplitude, frequency, r.p.m. condition, and position on the blade of the high-stress vibration—to remedy the matter by reducing diameter, thinning and/or narrowing the blade. In so doing, however, a small loss in performance generally occurs, as the blade no longer complies with the original optimum design. In addition, any change in blade design necessitates further strain-gauging of the whole airscrew in order to establish that the alterations are successful. Similarly, any subsequent alterations to the power unit which may affect the vibratory characteristics of the airscrew also demand a strain-gauging re-check.

Whilst this testing of the airscrew is in hand, the process of unit type-testing the ancillaries is in progress, and the constant-speed unit, reversing pump and feathering pump are all subjected to 50 hours of rig-testing designed to reproduce as nearly as possible the variety of conditions likely to be met in service. All these tests can, however, do no more than prove the mechanical and electrical efficiency of the units under simulated working conditions.

Individual tests of all the airscrew equipment having been completed, the various units are then brought together for the 115 hours' mandatory testing on the appropriate engine. If it so happens that engine approval is also under consideration, the required test duration is 155 hours, but in both cases the schedule of testing follows an internationally agreed set of requirements. In addition to periods of endurance running at cruising, climbing, maximum and minimum take-off and high-speed conditions, the principal operational requirements include 1,500 operations of the c.s.u. control over the effective range, 50 feathering and unfeathering operations and 200 reversing and unreversing operations.

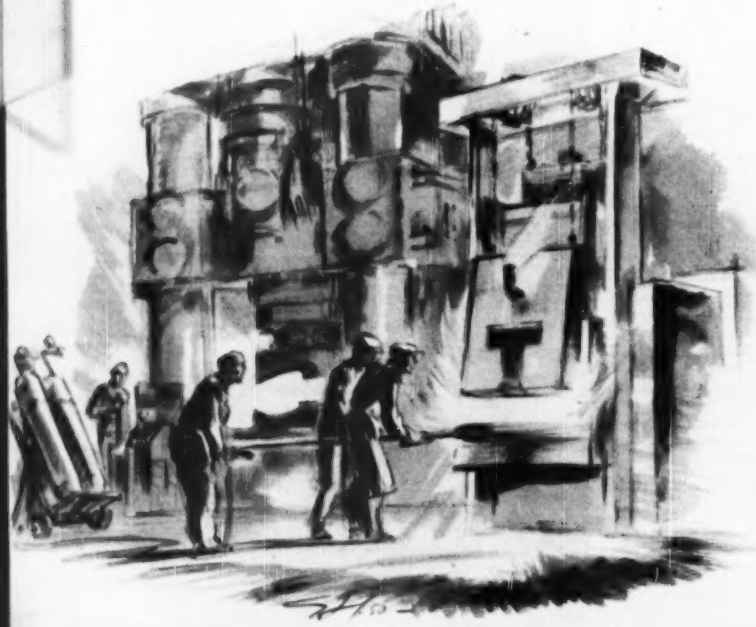
Tunnel-testing in progress with a Mamba turboprop

On completion of testing, and removal from the engine, each part of the equipment undergoes the normal acceptance tests as for a new unit, the purpose being to detect any falling-off in performance. These subsidiary checks are followed by complete dismantling and the close examination of every component. Subject to all parts being in a satisfactory condition, flight-testing can then go ahead without delay.

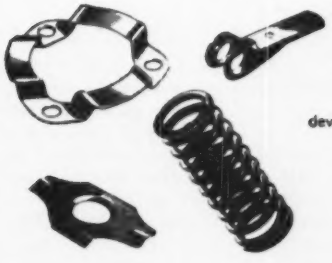
Despite the fact that flight-testing is nominally the final phase in development of the airscrew, it is frequently the most difficult and prolonged, because it is by no means always possible to predict the correct constant-speed-unit characteristics for all conditions of flight. Performance during the tunnel-tests is not an accurate guide, since the absence of flight-speed airflow through the airscrew disc gives unrepresentative loadings on the blades. Furthermore, entirely different conditions of control are created by the various attitudes and altitudes of the aircraft. As a consequence, it cannot be too strongly emphasized that it is entirely erroneous to imagine that an airscrew installation is fully proven and developed operationally by the time it reaches the first prototype flight stage.

The preliminary function of flight-testing is to establish satisfactory governing and synchronization, and many hours of intensive development involving numerous changes to the governor and prolonged flight-testing are at times necessary to achieve complete satisfaction. Feathering and unfeathering trials are also carried out at an early stage, these being followed by checks of the de-icing equipment. De-icing might appear at

Steel-blade development. The blade shells are withdrawn from the furnace, inserted in the adjacent 2,000-ton press and are then blown out against the dies by high pressure nitrogen.



The great Runcorn to Widnes transporter bridge, with its 1000ft. span across the Mersey and the Manchester Ship Canal, was opened in 1905.



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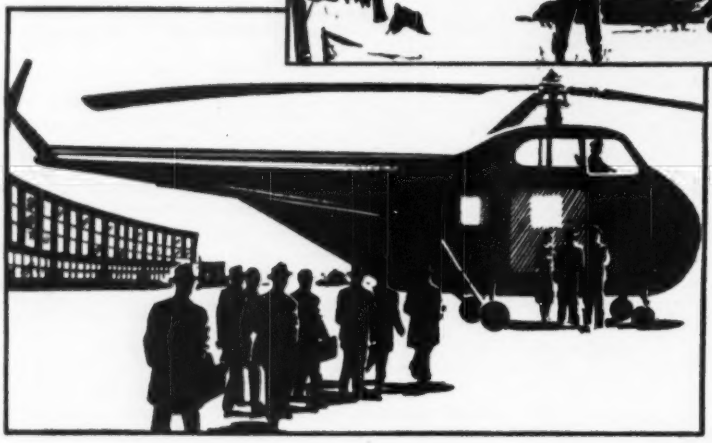

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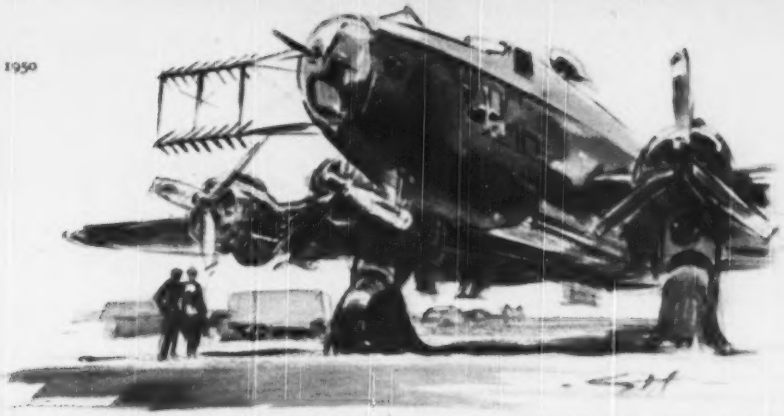


De-icing flight trials are performed with a Halifax on which is carried a spray-frame ahead of the starboard inner airscrew. Comprehensive test instrumentation is used to register performance characteristics and, in addition, photographic records are taken.

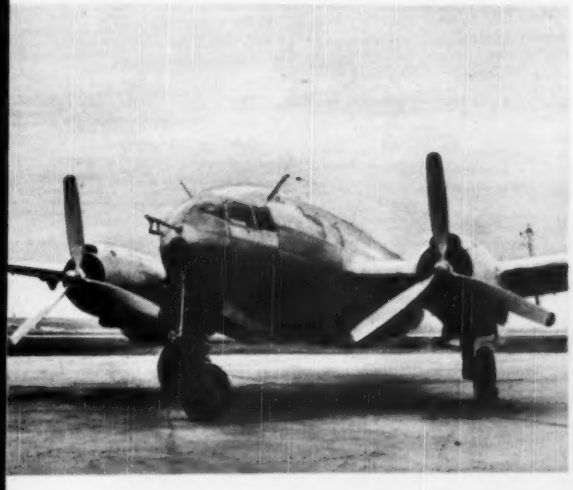
QUEST for EFFICIENCY . . .

first sight to be relatively insignificant in the sequence of testing, but as it is a safety requirement it is treated very seriously. The overshoe adhesion and fluid (or heat) dispersion under flight conditions, particularly in the case of contra-rotating airscrews, frequently demands a great deal of attention. In the case of braking airscrews, 50 landings using the reversed-thrust feature must be carried out on each specific installation, regardless of any previous testing which might have been done.

Flight strain-gauge testing is left until last because, although in the past it has not been a regular requirement, it is now generally regarded as essential since variations do exist between the results obtained in the tunnel tests and those obtained in flight. It is, of course, the vibratory stresses which are the primary concern, for these can vary as a result of fuselage interference, airflow conditions and so forth, and can only be determined by actual flight trial. There is, however, a particularly difficult form of vibration which is sometimes encountered and cannot easily be remedied, i.e., that due to aerodynamic excitation. This can be induced by the environment of the airscrew, and is most usually created or accentuated by the proximity of any structural excrescence. It may be such that there is no reaction in a transverse or torsional direction and it will be detected only in airscrews having more than three blades. This particular form of vibration is almost entirely "airscrew-contained" and it is, therefore, preferable to re-check the exact magnitude of the stresses under actual flight conditions—since they may be within permissible limits—rather than to embark upon extensive modifications which might reduce aerodynamic efficiency.

With the completion of the flight strain-gauging tests, the sequence of prototype airscrew approval is concluded and it is no exaggeration to state that it has few equals, either in length or complexity. Airscrew approval clearance is never a cut-and-dried process; development and approval testing inevitably proceed together and they are rarely ahead of an engine/aircraft project whilst, inevitably, they are always unsettled until the last. Bearing this in mind, the true nature of the de Havilland Propeller Company's achievement in putting through 265 distinct types of airscrew for development during the past year can be appreciated.

Many foreign aircraft come to Hatfield for airscrew trials; one of the visitors during recent months was the S.O. 30P Bretagne.



One corner of the elaborately equipped mobile laboratory with which vibration tests can be carried out in the field.

Passengers in the Autocar have a fine view of the countryside, although here they are watching the camera rather than Ascot below.

FOUR UP

Private-owner Travel by Air and Road: a Comparison of Performance and Costs

Illustrated by "Flight" photographs

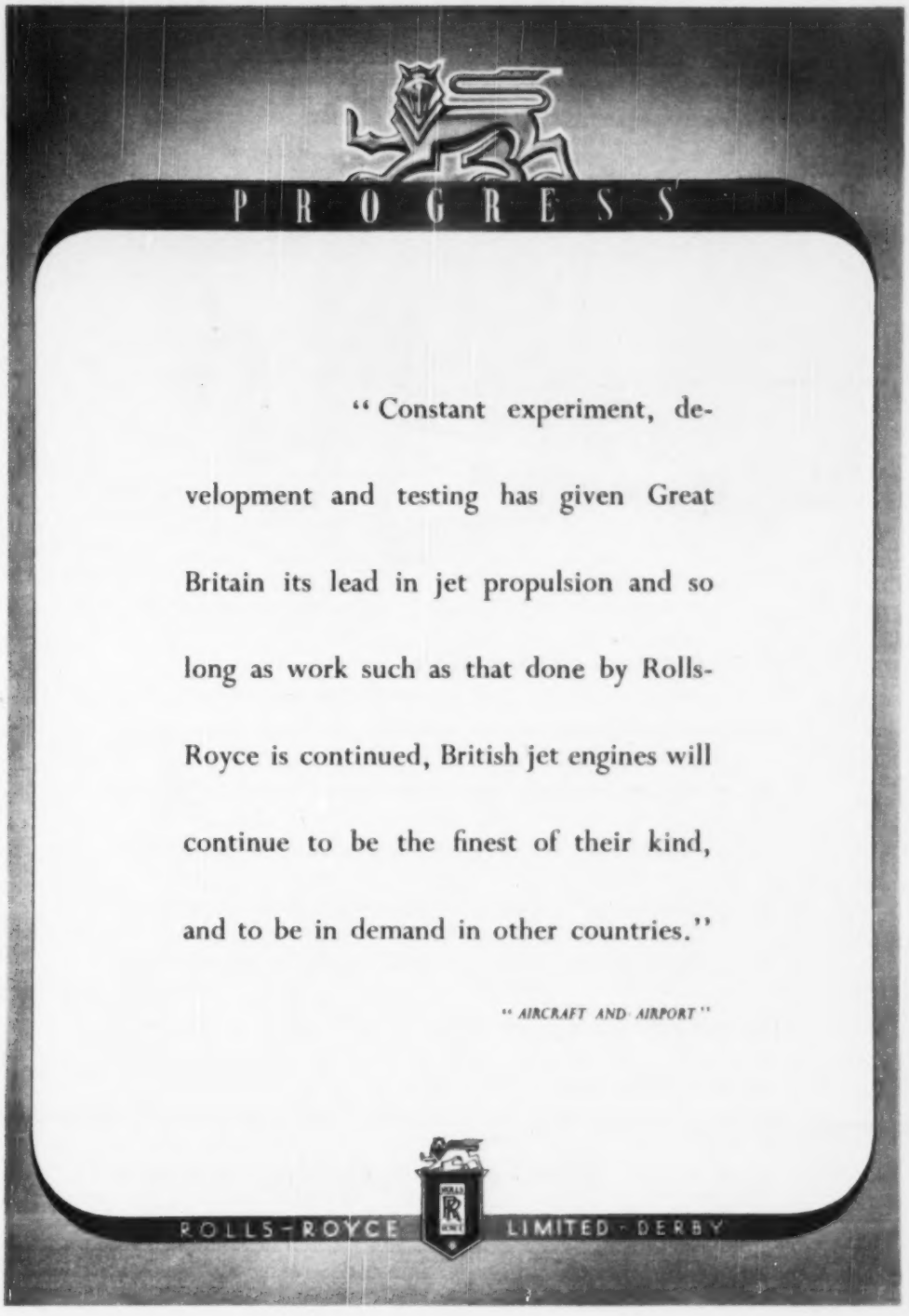
SPORTS cars and modern private aircraft are surprisingly comparable in many of their characteristics, although in a few they differ in a marked manner. These photographs illustrate the recently introduced four-seater Auster Autocar with 130 h.p. Gipsy Major engine, and it is interesting to compare its specification, costs and performance with those of an imaginary but typical sports saloon of similar power and capacity.

The Auster costs £1,500; the car, without purchase tax, would probably cost about the same. Seating layout is similar except that the driver of the aircraft usually sits on the "Continental" side and, moreover, the car would probably provide a little more room and comfort as well as being quieter.

What of performance? The Auster can cruise at just over 100 m.p.h. and has a maximum speed of 118 m.p.h. By comparison a car with 130 b.h.p. engine should cruise at 80-90 m.p.h. on suitable roads, and should be capable of just over 100 m.p.h. maximum. There would not be much difference in loaded weight, for the Auster weighs 20¼ cwt and the car should not exceed 24-26 cwt. Fuel consumption would be even closer. The Auster uses 6½ gal/hr at 105 m.p.h., which is a fraction over 16 m.p.g., and this figure would be improved by a small amount at rather lower speeds, say 90-95 m.p.h. At high cruising speed the car, too, could be expected to average 16-17 m.p.g. Both would normally run on the same grade of fuel. On balance, the aircraft would have a slight pull in the matter of fuel consumption, for it is able, by flying in a straight line, to reach a given

(*Concluded on page* 353)

(Above) New curves and tail identify the Autocar in side elevation. (Below) Virginia Water provides the attractive background.


PROGRESS
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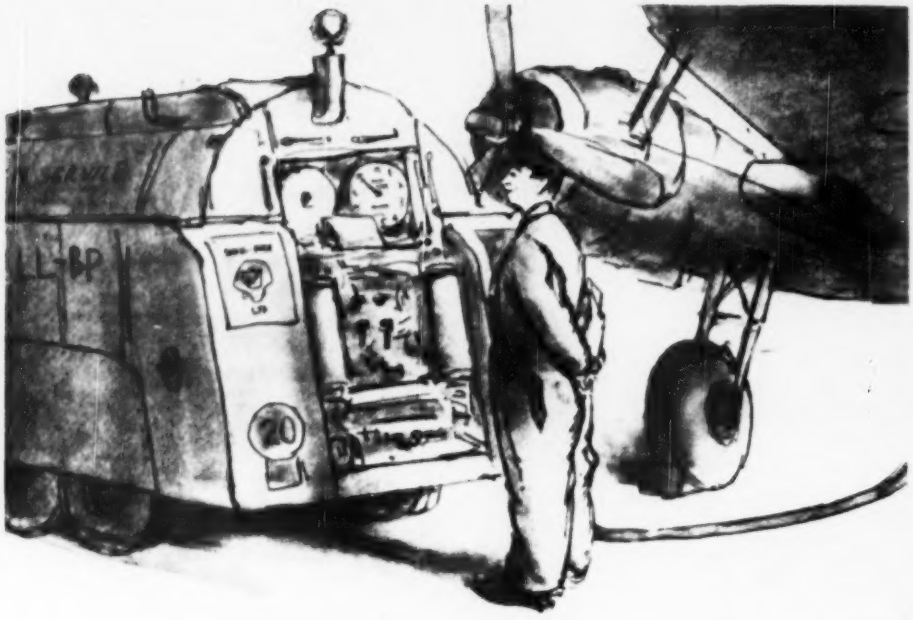

"Nine hundred on the clock"

" This dial shows how much petrol we've put into the Viking—900 gallons. This, on the left, tells us the rate of flow. Next one down indicates the r.p.m., of the pump motor. And on the right is the thermometer dial. You've got to keep your eye on a lot of things on this job." All day and every day the Shell-BP Aviation Service is on duty at major airports throughout Great Britain. Their Aircraft Servicing Vehicles and crews are ready to give swift, efficient service at a moment's notice—refuelling any aircraft from an Auster to a Stratocruiser.

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FOUR UP . . .

destination in fewer miles. A headwind might offset this advantage on some occasions.

It is not such a simple matter to compare running costs for a car and an aircraft, because standards of requirements are very different. Insurance depends upon many variables, although drivers' records and insurable values are considerations applicable to both. Because of the higher potential exposure, third-party cover is very much greater in the case of aircraft. Strangely enough, although third-party insurance is compulsory for a road-user, there is no law to compel a pilot to have any insurance at all. In practice, however, all aircraft are fully covered. To give some sort of indication of the cost of comprehensive insurance cover in each of the cases under consideration, a figure of £25 per annum may be mentioned as representative for the sports car and £105 per annum for the aircraft, for average private utilization of 20,000 miles (200 hr) per year.

Maintenance costs, assuming both vehicles to receive correct routine attention by qualified engineers, is another item difficult to compare. A car might cost 50s every 1,000 miles, plus one engine and chassis overhaul—de-coke, brakes, and so on—in 20,000 miles at a cost of £20. This gives an annual cost of £70. At least one set of four tyres would be required in this mileage, and these would cost about £16. Incidental repairs and adjustments would probably bring the total figure up to £90 p.a.

For the private aircraft the main annual servicing costs are for the renewal of the Certificate of Airworthiness and three 50-hour inspections. In addition, an occasional minor inspection and adjustment is desirable. The C. of A. for the first few years should not cost more than £60 on the average, and the 50-hour airframe inspections about £5 each. This makes a total of £75. Other minor inspections of the D.I. type (say, one per month) would cost about 17s 6d each, and the supply of an occasional spare part would bring this figure to £15; thus the overall total again amounts to about £90. However, some allowance must be made for engine overhaul, which in the case of the Gipsy Major would occur only every 7½ years, for it is a type which is officially approved for 1,500 hours' running between overhauls. This is a figure which will set most car engine designers thinking. If £10 p.a. is allowed for a share of the ultimate engine maintenance cost, the estimated figure for the Auster Autocar reaches £100 p.a. The car engine would need a major overhaul about twice as often as would the aircraft, i.e., every 60,000 miles. The cost would be, as a conservative estimate, and depending upon the number and configuration of cylinders, £80 to £100. Thus, some £30 should be budgeted each year for this purpose. The owner-pilot pays £1 1s registration fee, but the car owner pays £10 annual registration. Major overhaul and registration of the car therefore offset some £29 of the excess accommodation fees of the aircraft, referred to below.

It is not proposed to discuss depreciation, but a mention may be made of housing and parking, and here the aircraft is almost always at a disadvantage unless the owner happens to be a farmer—as is not infrequent in the case of Austers—with a good barn and meadow available. A light aircraft costs at least £1 per week for hangarage, and landing fees vary between free and 7s 6d for the weight of machine in mind. Season landing tickets are available for groups of home airfields at £5 p.a. each (two would cover most needs). Incidentally, Service or ex-Service pilots may land a private aircraft free of charge at R.A.F. airfields so long as prior permission has been obtained. For the hangarage cost a pilot should receive considerably more free service and facilities than would be expected from a garage. Flying control, navigation and met. services are available free of charge. In addition, one's aircraft is pushed out, started up and the engine warmed and checked in answer to a preliminary telephone call.

In large cities, and in particular in London, the garaging of a high-powered car may cost as much as £1 a week, while in the country it may be as little as 5s. There is a similar though not so pronounced difference in costs for aircraft housing, hangars at main airports generally being more expensive than those on small and remote airfields. It may be mentioned in passing that landing and housing fees abroad, particularly in France, tend to be considerably lower than in this country.

The foregoing discussion is not intended to put a case for owning an aircraft instead of a car, for the two are complementary forms of transport. Rather is it intended to indicate the remarkable similarity in cost and, to some extent, performance of the two. For those fortunate enough to be in a position to consider the ownership of two cars, or for the quite large number of people who have the use of car in connection with their business, the possibility of owning a light aircraft rather than a second (sports) car is worth serious consideration. M. J.

A GAS TURBINE on the ROAD

Convincing Preliminary Demonstration of the Experimental Rover Car

BRIEF references have appeared from time to time in *Flight* regarding progress being made with the adaptation of gas turbines for road vehicles, and in G. Geoffrey Smith's book, *Gas Turbines and Jet Propulsion*, an informative chapter is devoted to the subject. Readers will since have learned with special interest of the demonstration given last week at Silverstone of the turbine-engined Rover car, the first in the world to reach practical realization. It is particularly appropriate that the Rover Company should have had this honour, for during the war they were responsible for the development of the early Whittle units, and in conjunction with Joseph Lucas, Ltd., designed the "straight-through" combustion system to replace the original "reverse-flow" layout.

On Wednesday of last week, under R.A.C. observation, the car exceeded 85 m.p.h. on Lindley Airfield, near Nuneaton. Next day at Silverstone, it gave another impressive performance. A *Flight* observer who was present can testify that the characteristic turbine whine was not nearly so marked as in aircraft and was, in fact, noticeable only when the power unit was sharply accelerated.

Neither heat nor smell—the efflux is directed upways from vents behind the "cockpit"—were objectionably marked, and starting from cold was quick and certain. The car was ready to move off about 15 sec after the starter was switched on.

In an article in *The Autocar* last week it was stated that the power unit is of the two-shaft type. The first-stage turbine drives the air compressor alone, whilst the second-stage turbine—mechanically independent—transmits power through reduction gearing to a conventional rear axle. This arrangement gives, in effect, a pneumatic torque-conversion system and therefore no clutch or gear box is necessary or is fitted; the only two driving controls are the accelerator and brake.

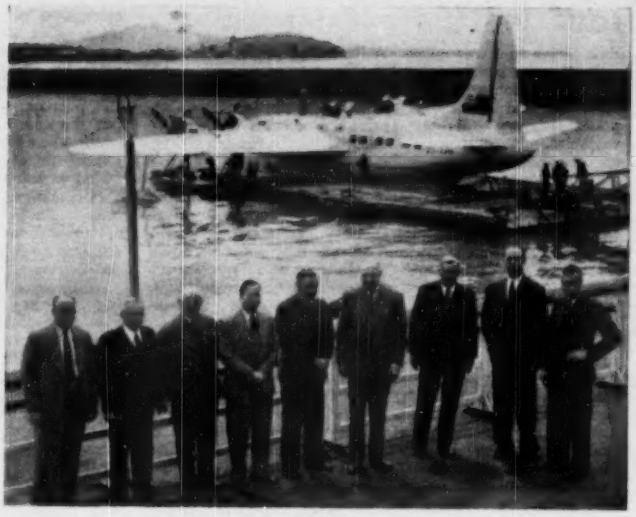
Designed to run at a speed of 40,000 r.p.m., the unit has so far been run at 35-36,000 r.p.m. on test; it idles at approximately 7,000 r.p.m. Fuel-consumption figures at the moment appear inordinately high by road-vehicle standards, but it must be remembered that the production unit, when it eventually appears, will be considerably smaller and will be equipped with a heat-exchanger, which will improve the thermal efficiency and effect a considerable economy.

Impressions of driving the Rover turbocar, by G. Geoffrey Smith, together with an account of the two tests, will appear in to-morrow's issue of *The Autocar*.

CONSULTANT'S APPOINTMENT

A SPECIALIST in steam and gas-turbine design, Mr. E. P. Peregrine, B.Sc., Mem.A.S.M.E., A.M.I.C.E., A.M.I.Mech.E., A.M.I.E.E., has joined W. A. Turner, Jeffrey and Co., consulting engineers, as a third partner. During the war he was engaged in gas-turbine research with Rolls-Royce, Ltd., and the Rover Co. In consequence of the appointment, the firm will be restyled Peregrine and Partners (incorporating W. A. Turner, Jeffrey and Co.); their offices are at the Manor House, Royston, Herts. (Royston 2213.)

CIVIL AVIATION NEWS



EXECUTIVE: During his recent tour of B.O.A.C.'s eastern routes, Sir Miles Thomas (chairman) visited the Auckland base of Tasman Empire Airways. He is seen here (sixth from left) with Sir Leonard Isitt, T.E.A.L.'s chairman (fifth from left), Mr. J.W.S. Brancker, manager, B.O.A.C. Eastern division (fourth from left) and officials. A Tasman Solent is seen.

INTRODUCING CLASS TRAVEL

THE first international airline to introduce the class-travel system is Air France, which, as from Tuesday last, is experimenting with first-class and tourist-class facilities on certain routes inside the French Union. The first routes on which the experiment is being made are those between Paris and Casablanca, and between Paris and Dakar. The first-class passenger travels at the existing fare in a 44-seat version of the Skymaster; while the tourist-class passenger, paying 15 per cent less than the normal fare, travels in a similar aircraft with a seating capacity of 55.

AMERICAN FUEL TAX

AS an initial step towards making the airways self-supporting, the C.A.A. has proposed that a tax of 1.5 cents (approximately 1d) per gallon be levied on aviation spirit after 1953. It is estimated that the tax, which, so far as the operators are concerned, would be recovered by fare increases (or less generous fare reductions), could produce a revenue of some 8½ million dollars (about £3 million) a year. The proposal was announced before a meeting of the Interstate and Foreign Commerce Committee now investigating the U.S. transport problem; it will require Congressional approval.

Mr. Joseph O'Connell, chairman of C.A.B., was optimistic about the outlook for U.S. airlines in 1950. "The C.A.B., however," he said, "is not inclined to support further expansion of air traffic through additional Government subsidies. It will continue to urge airlines to explore the possibilities of mergers, route alterations and equipment interchanges."

THE LLANDOW ACCIDENT

IT is our painful duty to record the occurrence of an accident which, in the number of fatal casualties—80—must rank as the most serious air disaster to date. The only alleviating circumstances were that no fire followed and that, of the three survivors, two escaped comparatively unhurt.

The aircraft involved was a Tudor V, owned by Fairflight, Ltd., which was on a journey from Dublin to Llandow on Sunday, March 12th. It had been chartered to carry 78 passengers to and from the previous day's international Rugby match at Belfast. According to eye-witnesses, the aircraft made a low approach towards Llandow in fine weather, shortly after 3 p.m.; it then appeared to climb and, say reports, its engines cut. The Tudor dived into a field where, except for the tail section, it completely disintegrated. The crew, none of whom escaped, were Capt. D. J. Parsons (pilot), 1st Off. A. C. Graham, R/Off. B. A. O'Carroll, Engr. J. A. Berry, and Miss D. Davidson (stewardess).

Seating capacity of the company's Tudors had recently been increased from 72 to 78 with a crew of five. The Certificate of Airworthiness was for a maximum a.u.w. of 80,000 lb. Although Llandow (15 miles west of Cardiff) is an R.A.F. airfield, it is used by civil aircraft operating charter services, and is also available for the diversion of scheduled flights.

The Minister of Civil Aviation, Lord Pakenham, and A.V-M. D. C. T. Bennett, chairman of Fairflight, Ltd., both visited the scene of the accident on Sunday. The Minister intimated that there would be a Court of Inquiry.

It would be quite inadmissible to make any comment at this early stage, and equally pointless to recall, as some newspapers have done, accidents involving other marks of Tudor. We can only express the hope that the promised investigation will succeed in establishing the cause beyond reasonable doubt.

THE CHARTER TRAIL

WITH the announcement that Kearsley Airways, Ltd., have decided to cease flying operations yet another chapter is recorded in what might be described as the insidious elimination of our charter companies. The company states: "After thoughtful consideration of the present charter market situation and of the prospects for the future, the directors of Kearsley Airways, Ltd., have decided to cease air operations. The current unstable conditions have been caused by circumstances and events which are already well known and could only be retrieved, it is thought, by changes which are difficult to foresee in the immediate future. In view of this, the company has been forced into making its regrettable decision. Kearsley Airways, Ltd., will continue at Stansted Airport to overhaul and repair aircraft to A.R.B. standards."

This announcement reflects the general attitude and apprehensions of many of the charter companies today. Apart from the fact that there does not appear to be much hope of the situation improving in the near future, many companies do not consider it worth while to conduct business at the low rates which they have been compelled to quote. Dakotas are in many instances being flown at only a few pence above the direct operating cost in order to obtain ready money. Naturally enough, very few of the sounder companies are willing to "operate on a shoe-string."

The number of companies which have been virtually forced out of business by restrictive legislation and the formidable competition of the State-owned corporations has now reached distressing proportions. Their potential value to the nation as an air transport reserve in times of emergency has constantly been stressed in these pages, and that this regrettable state of affairs should be allowed to continue is—whether it is generally realized or not—a matter of the deepest concern to the nation as a whole.

P.A.A.'S MERGER CASE

DURING the lengthy C.A.B. hearing of the case for the projected merger of A.O.A. and P.A.A.—against which proposal, as recorded in *Flight* last week, T.W.A. has protested so strongly—Mr. H. J. Friendly, P.A.A.'s vice-president and general counsel, gave evidence. He claimed that a merger would result in greater savings to the taxpayer than have been offered in the history of the Civil Aeronautics Board.

Approval of the proposed sale has already been recom-

mended by a C.A.B. examiner after lengthy hearings and cross-examinations. The last legal step in the case (which began in December, 1948) has now been taken with the announcement of the agreement to the sale between A.O.A. and P.A.A. Mr. Friendly listed 17 different items under which savings would be made and which, he said, would secure "subsidy-reductions amounting to millions of dollars anually." He emphasized that, in the past history of air transport, marked savings had always been associated with increased traffic of the kind which would result from the sale.

Pointing out that both A.O.A. and P.A.A. had at least 75 per cent of their European business duplicated by direct American competition, Mr. Friendly noted that, while both the C.A.B. and President Truman had previously stated that more than one American carrier should operate on the North Atlantic routes, they had never desired such duplication of services as now existed. In his opinion, the two companies had been living in a fool's paradise as far as traffic between the United States and the United Kingdom was concerned. Mr. Friendly gave the warning that, although until this year it had been held back by lack of suitable equipment, B.O.A.C. now had far greater capacity to carry the annual traffic between the two countries. He said "the proposed sale has come just in time to prevent a destructive three-way battle for London traffic."

Reiterating the examiner's finding that T.W.A.'s Atlantic traffic will not be harmed by the merger, Mr. Friendly pointed out that the company has direct American competition on only ten per cent of its business on that route, and that acquisition of A.O.A. will not give P.A.A. access to any points on T.W.A.'s routes. T.W.A.'s strong points he listed briefly as "a complete American monopoly on the Paris-Rome-Cairo service, very little foreign competition and direct access to domestic markets across the United States."

Representatives of American Airlines and A.O.A. also appeared before the Board. They argued that the proposed route-structure would establish an airline pattern similar to that which existed in Southern Europe, where a single American company (T.W.A.) was operating. Such a pattern would bring the transatlantic route structure more closely in line with the principles of competition desired by President Truman.

Although the C.A.B. hearing ended last week, it will probably be some time before any decision is announced. While at this stage it is virtually impossible to give any accurate forecast of the effects which the merger may have on the other airlines operating across the North Atlantic it is nevertheless fairly obvious that such a powerful combination as A.O.A. and P.A.A. will considerably increase the competition which B.O.A.C. has to face on the services in question.

AUSTRALIA'S NEW POLICY

THE Australian Minister for Air and Civil Aviation, Mr. T. W. White, D.F.C., recently made some forthright remarks on the policy which his Government intends to adopt towards aviation in general. He stated "The Government policy is to expand the Citizen Air Force into something considerably greater than the four squadrons now in existence. Their individual strength, also, should be far greater." Mr. White quoted as an example the "ridiculous strength of six pilots for the City of Sydney squadron." He continued, "It is also intended that there should be no monopoly of air transport and all applications for the inauguration of new services will be treated on their merits irrespective of which organization has applied. The three State-owned companies, Q.E.A., T.A.A. and B.C.P.A., will in future be expected to make a profit on their operations, and all future appointments to the Boards of these organizations will be men with considerable business and aviation experience, irrespective of their political views."

Mr. White said that any company which cared to apply for an air route without subsidy would be given full opportunity to operate, as the Government was very keen to see the inland towns linked by air services. He was anxious, also, to see elementary flying training carried out by the clubs, with whom the R.A.A.F. should co-operate more closely in order that club-trained pilots could be more easily absorbed into the Service.

Now that such a complete reversal of the official attitude towards Australian civil aviation is apparent it will be interesting to note the trend of events, particularly so far as the financial results are concerned. In spite of the fact that many of the circumstances of operation are peculiar to the area it should eventually be possible to draw some useful conclusions as to the relative merits of two widely differing approaches—by State control and by free enterprise—to the development of air transport.

NATIONALIZED INDIAN AIRLINES?

ACCORDING to the Minister of Communications, the Government of India is considering the possibility of nationalizing the country's air-transport services. He stated recently that a daily expenditure of some 15,000 rupees had been incurred by the Government in assisting the airline companies to operate the controversial "all-up" air-mail scheme. The question of complete nationalization is being considered as a possible modification of the present arrangement.

At a recent meeting in Bombay of Aero-workers' Federation delegates, representing nearly 15,000 employees of scheduled operators all over India, a resolution was unanimously passed demanding nationalization of the major Indian companies.

ASSAM AIR LIFT

OWING to the strained relations between India and Pakistan, great difficulty is being experienced in sending supplies from Calcutta to Assam. One solution has been a small-scale air lift, in which Indian charter operators are reported to be doing profitable business. Owing to the shortage of aviation fuel supplies in Assam, aircraft have to carry sufficient fuel from Calcutta for both the outward and return flights, and freight capacity is thus severely restricted. General cargo is flown from Calcutta to the landing areas in Assam; on the return flights, however, the loads are composed mainly of tea.

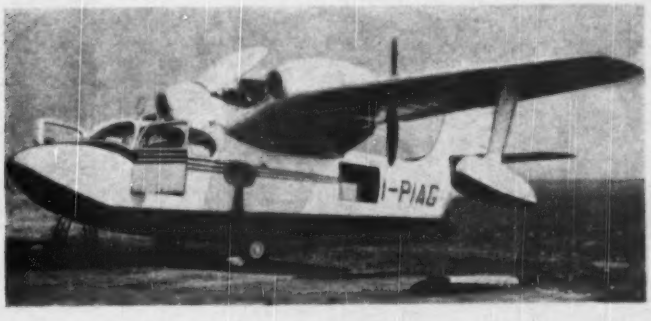
It is estimated locally that the air lift will probably last for at least six months and may even continue for over a year. Because of the shortage of available aircraft, British charter operators may be invited to take part if permission can be obtained from Indian authorities.

THE MARTIN 4-0-4

A 35-million-dollar order for a total of 65 twin-engined Martin 4-0-4s has been announced jointly by Eastern Airlines and T.W.A. Eastern will receive 35 and T.W.A. 30 of the new aircraft. The Martin 4-0-4 has a passenger capacity of 40 and is an improved and pressurized version of the 2-0-2, which for the past two years has been used extensively by U.S. internal operators. It is powered by two Pratt and Whitney R-2800 CB16s which develop 2,400 h.p. with water injection; reversible-pitch airscrews are fitted. A maximum speed "at cruising altitude" of 312 m.p.h. is claimed, together with unusually low landing-speeds. As in the 2-0-2, hydraulically-operated passenger steps are built into the lower section of the fuselage to save time in loading.

The choice of the 4-0-4 by two such important operators as T.W.A. and Eastern Airlines is an interesting one, particularly in view of the fact that the 4-0-4 is claimed to be the first production airliner designed and stressed for conversion to turboprop power. The installation of suitably developed power units of the Allison T-38 type would substantially increase its already high cruising speed, and extend the useful life of the aircraft for several years.

Economical cruising speed of the basic



PUSHER CONTENDER: This Piaggio P.136 (two 215 h.p. Franklin engines) was to have attempted a long-distance record last week, but the take-off ended in undercarriage failure

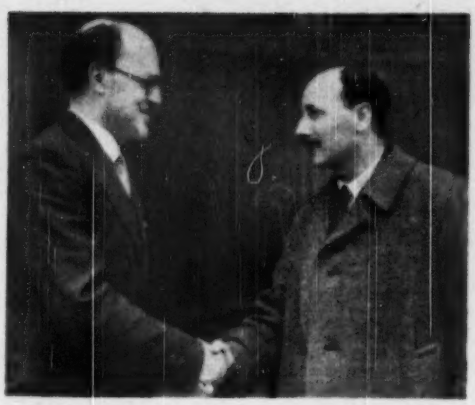
CIVIL AVIATION NEWS . . .

type—the 2-0-2—is about 300 m.p.h. at 16,000 ft., giving a break-even load-factor of about 50 per cent. Conversion to turboprop power would make the 4-0-4 an attractive aircraft on high-frequency short-stage services. By comparison, the Vickers Viscount has a normal cruising speed of 288 m.p.h. at 27,000 ft; seating capacity is also for 40 passengers.

In view of the fact that commercial development of an American turboprop can be expected to take two or three years, it would appear that there is still a possibility of considerable dollar orders for British turboprop air-liners from U.S. operators.

FACILITATION OF TRAFFIC PROCEDURES

IT is announced by I.C.A.O. that its member-nations have agreed in substance to a plan for standardization of customs, immigration and related procedures, designed to speed international movement of passengers and cargo. One provision of the projected arrangement is for an embarkation-disembarkation card which would eliminate temporary entry permits and the many official forms now required by Immigration Control. A further provision is for "direct transit" zones which will simplify the existing formalities for passengers who are continuing on the same flight or are making direct connections for other destinations.



NEW BOY: Lord Pakenham greets his newly appointed Parliamentary Secretary, Mr. Frank Beswick, on his arrival at Ariel House as successor to Mr. G. S. Lindgren.

BREVITIES

THE first indication of the success of the lengthy demonstration tour undertaken by a Saab Scandia throughout North and South America has come in the form of an initial order for six aircraft, placed by Aerovias Brasil—V.A.S.P. The company's present fleet consists of some 40 DC-3s.

* * *

Air India International's Sunday London-Cairo-Bombay service is now calling at Rome. Flying time from London to Rome is 4½ hr. The two other weekly services in each direction are continuing to fly via Geneva, Cairo and Basra.

* * *

The Australian Government is making a special survey of the North Coast of New South Wales with a view to constructing flying-boat bases at Coffs Harbour, Kempsey and Grafton, where a network of connecting services may soon be inaugurated.

* * *

Fines totalling £30, with £5 5s costs, were imposed at the Beaconsfield Magistrates' Court on March 7th on a pilot who was charged with flying an aircraft when not in possession of a current licence. He was seen on two occasions flying a Piper Cub for about 10 minutes in the vicinity of Denham airfield.

* * *

Following an air traffic agreement with Spain, the Scandinavian Airlines System is to resume its daily DC-4 flights between Stockholm and Spain *via* Copenhagen and Frankfurt, to operate with effect from April 16th. The Spanish terminal is as yet undetermined.

* * *

B.E.A. announces the appointment of Col. W. B. Wharton, O.B.E., to be Traffic Superintendent (British Services) at Northolt. It was Col. Wharton who first suggested to the Foreign Office, and subsequently organized, the civil contribution to the Berlin Air Lift. In his new post he will continue to handle B.E.A.'s associate agreements with charter companies.

* * *

To be named after the late Sir Charles Kingsford-Smith, one of the largest hangars in Europe is to be erected at Schiphol this year. It is to be 540ft long, 129ft wide, and 40ft high, and each of the two doors will be 240ft in width. Two canteens, to accommodate 500 people, will be located in the sides of the hangar. It will be recalled that Kingsford-Smith flew the Atlantic in 1930 with the K.L.M. pilot, Evert van Dijk.

* * *

The so-called Convair "Turboliner" (to which reference was made in *Flight* of February 23rd) is scheduled to make its first flight in June. The conversion is expected to effect a saving in unladen weight of 2,000 lb. In the opinion of the manufacturers, the aircraft will carry ample fuel reserves to meet C.A.A. requirements and provide for lengthy stacking periods "... a performance which pure jet transports will be unable to match."

Mr. Douglas I. Grant, K.C., has been appointed secretary of Trans-Canada Airlines. Mr. Grant is also secretary of Canadian National Railways. He succeeds Mr. W. H. Hobbs, who held the joint post until he was recently appointed to be a vice-president of C.N.R.

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In a reference last week to the activities of a company specializing in the survey of sites for rotor stations, and the general planning of helicopter-service facilities, the name of the organization should have been given as Rotor Stations, Ltd. Its offices, as stated, are at 9, Old Burlington Street, London, W.1.

* * *

At a recent meeting of the Joint Air Transport Committee of the Association of British Chambers of Commerce, the Federation of British Industries and the London Chamber of Commerce, Mr. J. Vivian Holman was re-elected chairman for the coming year. Mr. Leslie Gamage and Mr. J. S. Wills were re-elected deputy chairmen.

* * *

On March 20th, K.L.M. will inaugurate a "road-air" freight service between Birmingham and most of their important international terminals. The company has arranged for a daily collection of goods from factories in the Birmingham area; these will then be taken by road to London Airport, where departures are scheduled every two hours. The new service is designed to ensure delivery on the following day to the nearer European capitals, and to South America within 48 hours.

* * *

Aer Lingus traffic in February again showed a considerable increase over that for the corresponding month of last year. Some 9,153 passengers were carried, 5,137 of whom travelled on the London-Dublin route. The passenger total was 29 per cent higher than last year's figure. The amount of mail and cargo carried (196,820 kilos) was double that for February, 1949.

* * *

An analysis of a recent week's cargoes carried by B.O.A.C. between London and New York shows that printed matter amounting to 3,391 lb was the main item. Machinery spares totalled 1,450 lb, photographic material and ciné films 940 lb, and textiles 423 lb. Also carried were cutlery, food samples and livestock consisting of pigeons and one canary. Among the miscellaneous items was a sample of incense, weighing 4½ lb.

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The French S.O.30C twin-engined freighter, initial flight trials of which were carried out recently, has been demonstrated at Bretigny and Orly before representatives of the military and civil aviation authorities. The S.O.30C, (which has S.N.E.C.M.A. 14R engines) was seen side-by-side with the two versions of the S.O.30P (powered by Pratt and Whitney R.43s and CA18s). The CA18 version has just completed a series of 60 performance trials.

The equipment of Air Transport, S.A., is to be sold by public auction at Melsbroeck Airfield, Brussels, on Friday, March 24th (previews on March 22nd and 23rd). It includes two Lockheed Lodestars, a Proctor, an Auster and various spares.

* * *

The first intimation that production of a Jetliner under licence in the United States is contemplated was given in a recent statement by the president of A. V. Roe Canada, Ltd., Sir Roy Dobson, who said that American sales of the aircraft would probably depend on its being manufactured there.

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The Australian Minister of Civil Aviation, the Hon. T. W. White, has appointed G/C. G. Packer to the Australian Airlines Commission in succession to Mr. W. C. Taylor, whose term of office has expired. The chairman, Mr. A. W. Coles, who was appointed by the previous (Labour) Government, is due to give up his post in February. It is also announced that Essendon has now been graded as an international airport.

* * *

Trans-Australia Airlines' traffic in 1949 showed an increase of 96,000 passengers over the total for the previous year. Freight and mail increases amounted to 28.7 per cent and 87 per cent respectively. Announcing these figures, the chairman, Mr. A. W. Coles, said that if manufacturers' present plans were adhered to, a jet airliner would shortly be tested on the company's routes.

* * *

Special flights are being carried out by K.L.M. to Canada, Australia and New Zealand to assist in the large-scale emigration from Holland. The first flight recently left Amsterdam for Canada with 43 passengers on board. More services are scheduled for April. Emigration is being officially encouraged in Holland because of the high birth-rate, which, it is estimated, may increase the population from 10 to 15 million in 50 years' time. The K.L.M. scheduled services during 1949 averaged more than 90 a day and totalled for the year some 32,917 flights.

The three large airports under the management of the Port of New York authority, Newark, La Guardia and Idlewild, showed a combined net operating loss of $401,362 (approximately £143,000) during 1949. Last year the authority spent some $20,000,000 (about £7,142,000) on improvements at the three airports. The 1950 budget calls for a further expenditure of some $8,000,000 (£2,800,000) at La Guardia and Idlewild.

* * *

According to information submitted to the Senate Interstate and Foreign Commerce Committee by an aviation consultant, the use of DC-3s in 1949 incurred an estimated Federal expenditure of $16,000,000 in mail pay. It is estimated that a newly designed replacement would have a direct operating cost of 10 cents per aircraft mile less than that of a DC-3. The consultant considers that an urgent requirement exists for a small transport for use by feeder lines and the larger companies who include feeder services in their route-patterns.

* * *

An action has been instituted in the Los Angeles District Court by Dr. M. A. Garbell, who has filed a claim for patent-infringement involving the wing design of the Convairliner. The petition seeks an injunction to prevent further infringements; if it is granted it might result in the grounding of all Convairs at present operated by American Airlines, P.A.W.A., Western Airlines, K.L.M. and Sabena. Dr. Garbell, who was previously employed by Consolidated Vultee, claims that, shortly before his design was patented in 1948, it was incorporated in the Convairliner. If the suit is successful, damages may amount to several million dollars.

* * *

The A.B.A.C. has decided to postpone indefinitely the "Aerocade" which had been planned to take place this Easter. Explaining its decision the Association states that it has been influenced by the paramount need for all concerned to concentrate upon the successful introduction into the clubs of the A.T.C. training scheme. A suitable date later in the year will be chosen, and further details then announced.

INSTRUMENTAL DEVELOPMENTS

INTENDED not as a trade exhibition but as a demonstration of certain developments of science as applied to industry, the 34th annual exhibition of the Physical Society is to be held from Friday, March 31st, to Wednesday, April 5th, at the Imperial College, South Kensington. Over 120 exhibitors will participate and, as in the past, a number of instrument-manufacturers and others whose products are used in the aircraft industry will be represented. Among the exhibits of these firms are the items mentioned below.

Henry Hughes and Son, Ltd., at last year's Exhibition, displayed an aircraft gyro-magnetic compass intended to provide accurate directional reference unaffected by the errors normally associated with other types of compasses. The "heart" of this system comprises electro-magnetic detector elements which measure the angle between the aircraft's heading and the earth's magnetic field. Since the last Exhibition a considerable amount of research work on detector elements of this type has been carried out by the Kelvin Hughes organization, with the result that a new type of transflux magnetic detector element, utilizing a material known as "Ferroxcube," is now being employed and will be exhibited.

Kelvin and Hughes (Industrial), Ltd., on the same stand, will demonstrate their latest strain-recorder equipment, in which a variable-impedance conversion unit is used. The unit operates in conjunction with the firm's single-channel Mk V recorder. Application of the equipment to aircraft structural testing will be shown, for which purpose a model wing will be subjected to mechanical vibration and a strain gauge and accelerometer will be mounted within it. Either instrument can be connected to the amplifier for demonstration purposes.

Mullard Electronic Products, Ltd., will show a most extensive range of new research and test equipment. One item of unusual interest will be an ultrasonic soldering-iron, by which it will be demonstrated that aluminium and its alloys can be tinned if they are subjected to intense ultrasonic vibrations at the same time as the solder is applied. The violent agitation disrupts the tough oxide coating which forms so quickly on light alloys.

Philips Electrical, Ltd., will include among their exhibits the new Philips X-ray diffraction unit, which offers wide scope for non-destructive chemical analyses, and the identification of the alloy components and compounds of metals. Machined faces in the vicinity of the tube apertures permit the attachment of camera tracks, whilst a circular platform for mounting other types of cameras is also provided.

DESIGN DATA

CONTENTS of Vol. 1 Part IV (February, 1950) of *The Aeronautical Quarterly*, recently published* by the Royal Aeronautical Society, include papers on the following subjects:

"Bending Moment Induced in the Booms of a Spar at the Point of Application of a Concentrated Load," by H. F. Winny, Ph.D., F.R.Ae.S.

"Strength of Aeroplanes in Relation to Repeated Loads," by D. Williams, D.Sc., M.I.Mech.E., A.F.R.Ae.S.

"Supersonic Flow Past a Slender Ducted Body of Revolution with an Annular Intake," by G. N. Ward.

"Steady Circulatory Flow about a Circular Cylinder with Uniformly Distributed Suction at the Surface," by J. H. Preston, M.A., Ph.D., A.F.R.Ae.S.

"Control-reversal Effects on Swept-back Wings," by W. H. Wittrick, M.A.

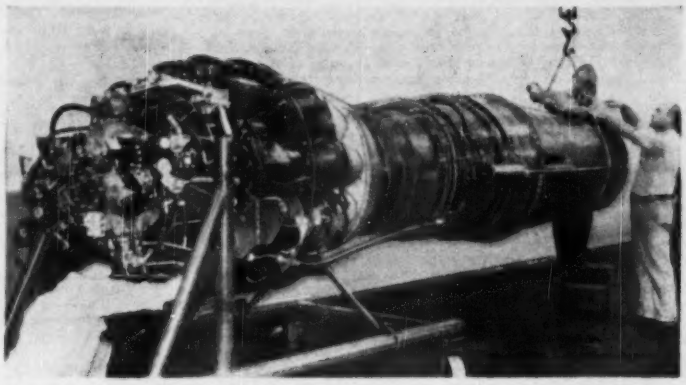
* *Royal Aeronautical Society, 4, Hamilton Place, London, W.1. Price 10s.*

FORTHCOMING EVENTS

March	16.	Women's Engineering Society - Symposium, "Women and Aircraft."
March	16.	R.Ae.S.: "Air Survey," by Prof. C. A. Hart, M.Sc.(Eng.), Ph.D., M.Inst.C.E., F.R.I.C.S.
March	17.	Institute of Transport: Annual Dinner.
March	21.	R.Ae.S. Section Lecture: "Boundary Layer at High Speeds," by A. D. Young M.A., F.R.Ae.S.
March	22.	R.Ae.S. (Manchester): "Accident Investigation," by A. Cdre. Vernon Brown, C.B., O.B.E., M.A., F.R.Ae.S.
March	23.	R.Ae.S. (Glasgow): "Fuel Consumption," by J. Leggett.
March	23.	R.Ae.S. (Isle of Wight): "Gliding," by P. A. Wills, C.B.E.
March	24.	College of Aeronautics Senior Common Room Society: Annual Dinner.
March	24.	Aircraft Golfing Society: Annual Dinner.
March	25.	Helicopter Association: "Performance Testing of Helicopters," by F. O'Hara, M.A.
March	27.	R.Ae.S. (Bristol): "Gliding," by A. H. Yates, B.Sc., A.F.R.Ae.S.
March	28.	R.Ae.S. Graduates: "Undercarriage Design and Testing," by G. S. Cranwell, Grad. R.Ae.S.
Mar. 28-31.		Royal Meteorological Society: Symposium, Oxford.
March	29.	R.Ae.S. (Gloucester and Cheltenham): "Aircraft Materials and Processing," by Dr. H. Sutton, D.Sc., F.R.Ae.S., F.I.M. (at Gloucester).
March	30.	R.Ae.S.: "Testing Aero Engines and Power Plants," by A. C. Lovesey, O.B.E., B.Sc., F.R.Ae.S.
April	1	British Interplanetary Society: "Space Travel—Fact" and Fiction," by A. C. Clarke, B.Sc.
April	1.	Aircraft Golfing Society: Captain's Prize, Laleham G.C.
April	3.	Institute of Transport: Brancker Memorial Lecture—A.V.-M. D. C. T. Bennett, C.B., C.B.E., D.S.O.
April	3.	R.Ae.S. (Derby): "Testing Engines and Power Plants," by A. C. Lovesey, O.B.E., B.Sc., F.R.Ae.S.

GAS-TURBINE CO-OPERATION

Benefits of Joint Effort by a British and a U.S. Manufacturer



Wasp with added sting: Pratt and Whitney, whose development work on the J-48 Turbo-Wasp (derived from the Rolls-Royce Tay) is referred to below, have now produced one version of the unit with an afterburner, as illustrated here. The first installation has been made in the North American F-93A interceptor, a redesigned long-range version of the F-86 Sabre. The total output is said to be about 8,000 lb thrust

WHAT is, in our view, the ideal method of co-operation between British and American gas-turbine engineers, has been taking place for many months past between the Rolls-Royce and Pratt and Whitney companies. Close co-operation has, in fact, existed since 1947, when Pratt and Whitney began production of the Nene, or to use its American designation, the J-42. Grumman Panther fighters, now in service with the U.S. Navy, are powered alternatively by the J-42 or Allison Model 400 (J-33). It is claimed, incidentally, that during recent comparative trials the J-42-powered Panther outclimbed its J-33 counterpart to 30,000ft and to 40,000ft.

Externally the Tay and Nene are almost identical, and the two units are essentially interchangeable. The Tay, however, aspirates 30 per cent more air than the Nene and has a 25 per cent greater basic power rating. The considerable increase in power has been made possible by ingenious improvements to detail design—mainly the work of the original designers, the Rolls-Royce Company—coupled with intensive and intelligent work by Pratt and Whitney, the foster-parents. Modifications to the original concept have been referred to in general terms only, but of the J-48 it has been stated that they include a new impeller and longer turbine blades, in addition to the extended use of magnesium alloys.

Both companies can take some of the credit for the fact that the J-48 Turbo-Wasp is the most powerful turbojet flying in the United States today. An announcement to this effect was made on February 26th by the Pratt and Whitney Division of the United Aircraft Corporation. One version of the Tay, and its American counterpart, are rated at 6,250 lb static thrust. Two American fighters are powered by the J-48: the Grumman F9F-5—latest development of the Panther—and the North American F-93A, a redesigned long-range version of the F-86 Sabre interceptor. Both these aircraft have J-48s with water injection for increased combat, take-off and climb performance, and the F-93 has provision for afterburning in addition. Our illustration shows the Pratt and Whitney J-48 with afterburning as installed in this aircraft.

Operational experience already gained with J-48s includes twenty successful flight tests and 1,800 hr of ground running. During two 150-hr endurance tests, the new turbojet delivered power in excess of the guaranteed rating, both with and without afterburning. Pre-production units are undergoing further testing, and a B-29 "test-bed" is to have a J-48, with afterburner, in its bomb-bay for flight development. The U.S. Navy has ordered 364 J-48s, and full production is due to begin in the summer. Tooling-up is well under way at Pratt and Whitney's factory at East Hartford, Connecticut.

The general manager of Pratt and Whitney Aircraft, Mr. William P. Gwinn, has stated: "Through this joint effort an engine of much higher power has been made available to the military Services of both countries much sooner than would otherwise have been possible." Many P. and W. engineers, says the American company, have become almost as familiar with the Rolls-Royce works at Derby as with their own East Hartford plant.

In England there is only one proposal for Tay installation and that is an experimental version of the civil Viscount which is expected to fly later this year. In this instance, of course, the two Tays will have no afterburning.

The fact that in this country very little has been heard of the Tay, with or without afterburning, may be the result of more stringent security regulations, but is more likely to be an indication of Rolls-Royce's complete concentration on the later axial Avon turbojet.

NEW JET-PROPULSION UNITS

UNDER the joint auspices of the U.S.A.F. and the U.S.N., a co-ordinated programme of basic research is now being conducted by scientists of Princeton and Cornell Universities and five other colleges. Termed "Project Squid," it calls for investigation of: (1) New jet-propulsion systems; (2) methods of heat transfer; (3) dynamics of gas flow; (4) reactions of fuels and oxidizers; (5) flame propagation in combustible gases; (6) instruments for jet-propulsion research; and (7) properties of heat-resistant materials.

In the first section of the programme the potentialities of three new propulsion units are being explored. One is a ducted pulsejet for operation at velocities in the range of Mach 1.0 to 2.0. The efficiency of the usual pulsejet is impaired by the air entering the intake at too high a velocity. By encasing the pulsejet in an outer jacket which serves as a diffuser, the intake air is slowed down and operation is improved. The excess air flowing around the pulsejet mixes with the efflux, augmenting the mass flow and thereby increasing the thrust.

A second type of power unit is the intermittent ramjet, in which the fuel is introduced cyclically instead of continuously. Combustion is intermittent and accompanied by a rise in pressure. As thermal efficiency, and consequently specific fuel consumption, depends on the mean operating pressure, the intermittent ramjet should, theoretically, be superior to the continuous ramjet. The present investigation will determine whether this theoretical advantage can be realized in practical operation.

Finally, there is the ducted rocket-unit. In this a liquid rocket-motor is enshrouded in a casing resembling a ramjet duct. Air rammed into the diffusing intake flows around the rocket motor and joins the rocket gas-stream before being ejected from the propulsion nozzle at the rear. The problem of mixing a supplementary air stream with a rocket exhaust of supersonic velocity has been the subject of studies extending over the past two years.

The aim is to secure efficient operation in the lower speed range, Mach 1.0 to 2.0, in which the propulsive efficiency of the rocket motor is low. By utilizing some of the normally wasted energy to accelerate a secondary air flow, thrust is increased and the specific rate of fuel consumption is lowered.

For investigation in the laboratory, a small rocket motor producing 50 lb thrust has been developed. Liquid oxygen is used as the oxidizer, with ethyl alcohol, petrol or diesel oil as the fuel.

AN OPENING EXISTS FOR A JET AIRLINER

It is common knowledge that refuelling in flight has triumphed over the limitations of range and endurance for all current types of aircraft—jet fighters as well as piston-engined airliners and long-range bombers. The most spectacular instances of this triumph were last year's non-stop flight round the world by a Boeing B-50 of the United States Air Force, and the refuelling of a Meteor jet fighter which remained airborne for twelve hours. En-route fuelling has proved itself a fully practicable proposition on day and night airline schedules. The Flight Refuelling Service has all the experience and equipment necessary to ensure safe and efficient operation with the fastest jet airliners.

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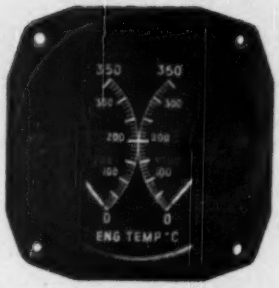

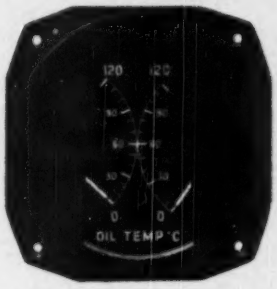

Illustrations show :

Above : Model 5128. Dual Engine Temperature Indicator, comprising two Millivoltmeters of 100° scale housed in large-size S.A.E. case. For use in conjunction with copper/constantan, iron/constantan or chromel/alumel thermocouples.

Below : Model 5127. Dual Ratiometer Indicator, comprising two 100° Ratiometer movements housed in large-size S.A.E. case. For use in conjunction with thermometer bulbs, electrical oil pressure transmitters, electrical position indicators or any combination of two of these to indicate a variety of temperatures, pressures or positions.

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FROM ALL QUARTERS

ENGINES, GOVERNMENT AND INDUSTRY

ALTHOUGH a newly published work* on aircraft engines and fuels is American, and both the studies are primarily on the question "how can Government and industry work together to keep (U.S.) technical research and development up to, or ahead of, that in other countries?", the subject-matter is of almost equal point and value to British aviation interests. The authors answer this question with specific recommendations based on their careful analyses of numerous development projects since the 1914-1918 war. Experience in the United States, Great Britain and Germany has been examined in detail, and the evidence is presented in order that the reader may judge the results for himself.

* "*Development of Aircraft Engines*" and "*Aviation Fuels*." (*Two studies of relations between Government and Industry.*) By *Robert Schlaifer and S. D. Heron. Harvard Business School, Boston, Massachusetts. Price* $5.75.

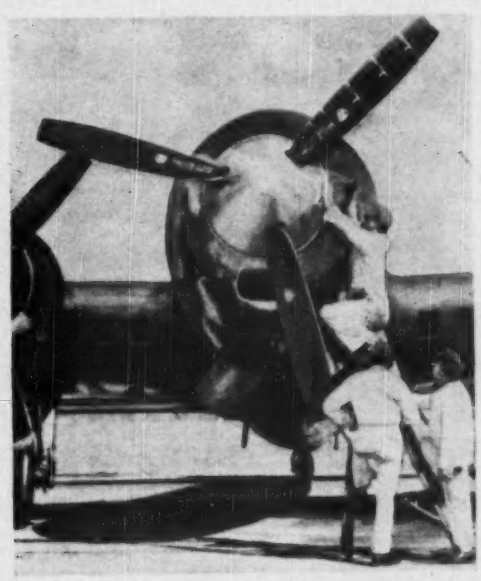
HOLLYWOOD SUPERSONICS

THE prototype fighter pulls out of an indubitably supersonic dive 15,000ft overhead, rolling as it climbs away. The U.S.A.F. general goes into a brief huddle with his staff, then turns to the expectant manufacturer. "Your plane has passed the qualification tests," he says. No bother, it will be observed, with all that tiresome analysis of test pilots' reports which occupies so much time at our own Boscombe Down.

Possibly the fact that the intrepid pilot has an eye for the manufacturer's comely secretary has something to do with this conveniently drastic simplification which forms the opening scene of a new film, *Chain Lightning*. Nevertheless, the story is well acted, fast-moving and good entertainment. The jet fighter "designed" for the film was actually a 45,000-dollar wooden mock-up capable of taxying (the flying sequences were mostly model-shots). From needle-nose to swept-back tail, its appearance is passably realistic, and only the pedantic would deplore the absence of an air intake.

The somewhat improbable story concerns the conflict between an egotistical test-pilot and his company's chief designer. Their employer seeks publicity and production contracts for the new fighter before the designer has perfected a pilot-ejection cockpit. This invention is finally accepted. The manufacturer gets the contract, and the pilot gets the girl. The unfortunate designer merely gets killed—by his own safety device.

WESTERN UNION? M. Louis Breguet (third from left), the pioneer French constructor, recently visited the Fokker Works and saw the S.11 trainer under construction. It is rumoured that a licence agreement to manufacture the S.11 in France is under consideration. On M. Breguet's left is his son Pierre.



TURBOPROBOSCIS: In anticipation of the recently announced proposal to install Allison XT-38 turboprops in a Convair 240, the manufacturers of this most interesting new unit have been obtaining flight experience with an example in the nose of a B-17. In this photograph of the installation (seen with a special Aeroproducts airscrew), the intake area seems remarkably small for such a powerful unit. The output is reported to be 2,750 s.h.p. while the bare weight is only 700 lb. The diameter of this test-bed installation bears no relationship to that of the unit itself, which, incidentally, has a seventeen-stage axial-flow compressor. Reference was made to the XT-38 and the double version, the XT-40, in our January 19th issue.

A NEW RUST-REMOVER

THE metal-finishing division of the Pyrene Co., Ltd., Brentford, Middlesex, have recently introduced a new rust-removing compound which, although primarily intended for use on ferrous metals, can also be employed to remove corrosion products from aluminium and its alloys.

Known as "Preperite," the new material may be used either by brushing-on or in a tank. The immersion solution—which can be used either cold or hot—need not be periodically discarded and renewed; it can be kept in service indefinitely, provided that its constitution is maintained by an occasional addition of the basic chemical, the amount required being assessed by a simple analytical test.

On aluminium surfaces, it is claimed, "Preperite" leaves an etch which is conducive to good paint-bonding.

ESCAPERS AND HELPERS

FOLLOWING the recent London reunion of the R.A.F. Escaping Society with their Continental friends of the "Comet Line," the Richmond (Surrey) Branch of the Royal Air Forces Association is to assist in organizing, for next June, further visits by families from the Continent. Those willing to offer hospitality should communicate with F/L. Denis Hornsey, D.F.C., 2, Balmoral Mansions, East Twickenham, Middlesex.

SLOW-SPEED OSCILLOSCOPE

FOR observing and comparing slow wave-forms (for which the normal oscilloscope is unsuited), A. E. Cawkell, electronic engineers, of Southall, Middlesex, have designed a slow-speed oscilloscope, whereby wave-forms of frequencies as low as 0.1 cyc/sec may be observed on the long-persistence cathode-ray tube. Alternatively, the instrument may be used as a conventional oscilloscope, although the time-base frequency normally extends upwards only to 50 cyc/sec. Two beams are available, which may be moved with respect to each other along any axis, and which may be altered in amplitude and phase so as to be superimposed. This enables the unit to be used for wave-form distortion comparisons at very low frequencies.

The display is on a 6in tube with an orange filter, whilst a linear time-base is included with automatic synchronization of range from 0.25 to 50 cyc/sec. All necessary power units, including 2kv for the tube and a valve-stabilized general H.T. supply, are housed in a separate matching container with multicore cable connection. The makers' offices are at 7, Victory Parade, The Broadway, Southall, Middlesex.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Thunderstorm Flying

MAY I define the limits of my accord with Mr. Gardner (Correspondence, March 2nd) on the dangers of tropical cu-nim flying by night over the sea? I consciously used his own words (that 500ft is an unsuitable height for airliners under such conditions) to emphasize my agreement with him on this undeniable fact; I did not, however, say anything to suggest that I am "convinced that there is no haven to be found much below 30,000ft."

If "haven" is to mean tranquil air, then there will be none, but there is an abstract "haven" of safety to be found when one is greeted with the inescapable fact of having strayed into this sort of flight booby-trap. This consists in carrying out the right action, and pilots of aircraft with ceilings of 15,000 to 20,000ft (whatever their uniform) now mostly advise slowing-down and staying-put in a level altitude, no matter at what height the cloud has been entered. This is in accordance with the recommendations of "Cu-Nim Gusts," the excellent commentary which provoked this discussion.

Any other alteration of the power and elevator settings, either in a hopeless attempt to counteract the up or down draughts or else whilst searching for the cloud-base with such a fickle instrument as the pressure altimeter, ought in time, if stubbornly pursued, to end with a big splash. I do not believe that any wartime "Coastal" shibboleth can do much to improve the information originally conveyed through your contributor, Capt. Brice.

R. C. O. LOVELOCK.

Fleet, Hants.

R.A.F.V.R. Aircrew Recruiting

THE Air Ministry are always complaining of the shortage of recruits for the Volunteer Reserve, and yet, in spite of this, the requirements would appear to be unnecessarily strict: I refer to the qualifications required for service as a pilot cadet.

A minimum of 110 solo flying hours is called for, with no reservations as to type of machine flown or how the hours have been spent. This arbitrary means of selection is unfair, as whilst it does not debar those who have "stooged around" for 110 hours in a Tiger Moth, it does debar those partly trained, ex-wartime cadets, like myself, who have, say, 80 hours to their credit—in spite of the fact that such men are Service-trained and their experience covers navigation and *solo* cross-country flights. A flying test should be instituted and these men be given the opportunity of taking this test.

Gidea Park, Essex. R. A. PASCALL.

Giants of the Past

I NOTE in the March 2nd issue of *Flight* a letter from Mr. J. M. Houlding, and Editorial comment, concerning the IM series and some Tupolev designs. Mr. Houlding is correct in querying the designation, ANT-15; I have never met it yet and feel that it is unlikely that it ever referred to the *Maksim Gorkii*. This eight-motor aircraft, which crashed in 1935, was definitely the ANT-20.

Sixteen six-motor replacements were planned, but it is not correct that no machines materialized. As far as is generally known, only one was built; it went into service in 1940 and was registered SSSR L-760. Mr. John Stroud once suggested that it might have the type number ANT-20 bis, but I have seen no other mention of a designation.

A point on which more data would be desirable is a report some time in 1945 (I have not my records with me and cannot quote the exact date) to the effect that members of L'Escadrille Normandie-Niemen flew to Königsberg (Kaliningrad) in "a number of six-motor Russian aircraft." No more details have been forthcoming. This may be a reference to further examples like the L-760, but it has just struck me that the aircraft could have been Messerschmitt Me323s captured and used by the U.S.S.R.

DENYS J. VOADEN.

Oxford.

[When the prototype appeared it was quoted as the ANT-15 by a usually reliable source of reference, but it now appears, on further research, that ANT-15 may well have been the correct designation. We must apologize to Mr. Houlding for having challenged his statement.—ED.]

Aid for the Clubs

I AM indeed gratified, though somewhat amazed, to learn that at long last the clubs are to be given the opportunity to teach selected A.T.C. cadets to fly, but, at the same time, I feel that the clubs should be subsidized to enable ex-pilots of the flying Services, who are unable to spare the time to join the Reserve or Auxiliary services, or the cash to join the local flying club, to keep in practice.

Like many others I was taught to fly during the war, at great expense, and, until being shot down in 1944, managed to accumulate about 1,200 flying hours and a valuable experience of flying under all weather conditions in many parts of the world. At the end of the war, part of my gratuity was spent in securing an "A" Licence, hoping that ere long facilities would be granted to assist ex-pilots to keep in flying practice. Nothing, however, has been forthcoming, and I have now reached the point where, by reason of expense, I am unable to renew my Private Pilot's Licence unless I (illegally) take up a passenger who is willing to share the cost. New regulations, admittedly for the sake of increased safety, only increase the cost of flying and make it more difficult for club organization to continue.

I suggest that a subsidy to flying clubs to enable ex-pilots to continue flying would be a great service to this country and a cheap and effective method of ensuring readiness on the part of ex-members of a vital military force to assist in any future emergency. I further suggest that the minimum subsidy should be sufficient to cover the cost of renewal of the Private Pilot's Licence, that is to say, five hours in two years.

Leicester. PHILIP R. GOODWIN,
Ex-Squadron Leader, R.A.F.V.R.

Passenger Handling

IN connection with the extracts from the M.C.A. publication "Ground Handling of Aircraft at London Airport," which appeared in the January 12th and 19th issues of *Flight*, I should be interested to know if the possibility of using caravans for handling passengers through quarantine, immigration and customs formalities has been considered, particularly with regard to the medium/short-stage services.

Caravans, housing units for the three main controls, would be able to draw up to an aircraft as soon as it was "chocked" on the tarmac, and the passengers could be passed through, cleared and despatched direct to the town office of the airline concerned by their own bus (with a call, if necessary, at the terminal building to set down passengers who so wished).

The control units (quarantine, immigration, customs) could either be housed under one roof in one sizeable vehicle, or in two or three separate vans—preferably two, one for customs and one for quarantine/immigration.

It is felt that this mobility would serve considerably to ease the load on the main airport disembarkation facilities and, of course, the idea could equally apply to the embarkation side, but with less telling results. There is no reason why urgent cargo and mails could not be cleared in a similar manner.

M. S. PLATT, A.M.Inst.T.

Cairo.

Brazilian Enthusiast

AS a constant reader of your journal (which first came into my hands through the courtesy of the local manager of British South American Airways), I write to say how I appreciate your articles about the new types and improvements that have been produced by the British aeronautical industry.

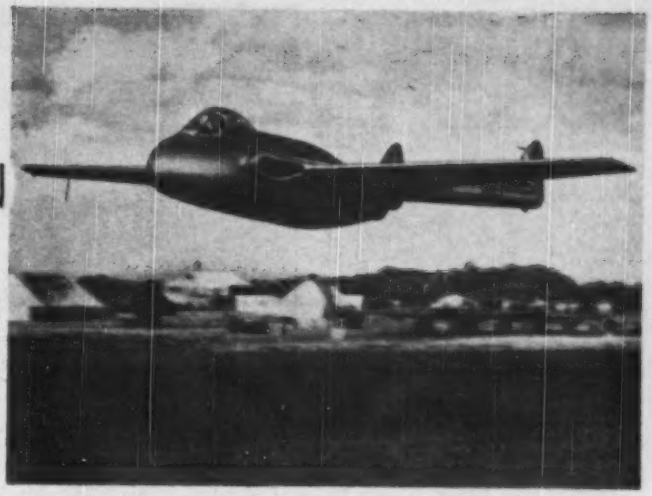
As you may know, there are practically no British aircraft here in Brazil, almost every private and commercial type coming from the United States. Through your journal I have been particularly interested in the Proctor and Gemini, which are, in my opinion, the best four-place British aircraft. I am now the owner of a Proctor, which is the only British machine in the whole northern part of this country.

I want to let you know how deeply I have been impressed by British aircraft through reading *Flight*.

Natal, Brazil. GRACO M. ALVES.

SERVICE AVIATION

Royal Air Force and Naval Aviation News and Announcements



NEW RECRUIT: Now ordered for Fighter Command, the de Havilland Venom (5,000lb thrust D.H. Ghost) is shown getting under way. It already promises to surpass the enviable reputation of its precursor, the Vampire, particularly at high altitude.

R.A.F. Aid in 1949

EXPENDITURE by the R.A.F. Benevolent Fund on all forms of assistance during 1949 totalled £715,670, an all-time record and an increase of more than £48,000 on the 1948 figure. Some £688,000 were spent in grants or loans to over 300,000 past and present members of the R.A.F. and W.R.A.F. and their dependants. Other items included housing assistance; upkeep of the Fund's own two schools and donations to certain other organizations for the benefit of R.A.F. and W.R.A.F. personnel in distress.

Cadet's Easter Camp

MORE than 600 schoolboys belonging to the R.A.F. Sections of the combined Cadet Force are to spend part of the Easter holidays at camp with the R.A.F. They will come from over 40 schools. About half will go to the R.A.F. College, Cranwell, and the remainder to R.A.F. Station Chivenor, near Barnstaple, Devon.

Each contingent—some between 20 and 30 strong—will spend a week in camp, during which the training received at school will be extended by technical instruction, as much flying and outdoor or practical work as can be arranged, and ceremonial drill. Cadets will also be introduced to R.A.F. organization.

Representing the R.A.A.F.

A LINCOLN of the Royal Australian Air Force, built in Australia, will take part in the R.A.F. Display at Farnborough in June, afterwards returning to the Commonwealth with a British crew. Its Australian crew will remain in Britain on exchange duty, with an R.A.F. bomber squadron.

Auxiliary Appointment

THE Air Ministry announces that S/L. J. W. E. Holmes, D.F.C., A.F.C., has been posted to command No. 603 (City of Edinburgh) Squadron, R.Aux.A.F. He succeeds S/L. G. K. Gilroy, D.S.O., D.F.C. S/L. Holmes, who was among the first aircrew volunteers to join the R.A.F. on the outbreak of war, enlisting as an A.C.2, was commissioned in October, 1941. He commenced flying duties with Nos. 263 and 137 Squadrons, becoming a flight commander in September, 1942.

Early in 1944, he took command of No. 266 Squadron, and was later posted to Germany as a flying instructor with No. 84 Group Support Unit. Since the war S/L. Holmes has served at the Empire Air Armament School, undergone a course at the R.A.F. Staff College and, latterly, he has been with Headquarters Unit, 66 Group.

No. 12 Squadron's Reunion

AN epic bombing raid for which F/L. Donald Garland and Sgt. Thomas Gray were posthumously awarded the first air V.C.s of the war, will be recalled by the reunion of ex-A.A.S.F. members of No. 12 Squadron in London on March 25th. The attack was made by five Battles of No. 12 Squadron on the Maastricht bridge in Belgium, in May, 1941: only one aircraft returned, with its observer dead. The participating crews had been selected by lots, as all the Squadron aircrews had volunteered for the operation, despite its "suicide" nature.

Among those expected to be present at the reunion are A.V-M. C. E. N. Guest and A. Cdre. H. L. Patch.

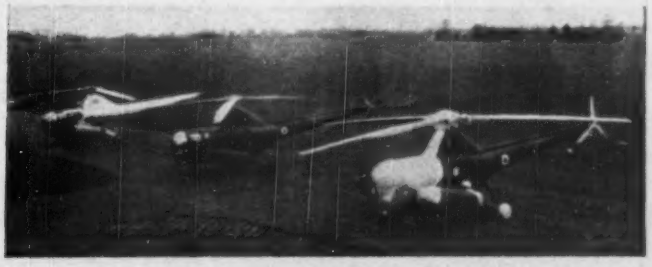
B.A.F.O. Dramatics

A PLAY written by a Royal Air Force sergeant is among those entered by the British Air Forces of Occupation, Germany, for the 1950 inter-Services occupation forces drama festival this month. The author, Sergeant Geoffrey Gladman, is stationed in Hamburg with a R.A.F. motor transport depot. His play is entitled *Remember the Ninth*.

Altogether there are twelve entries from the R.A.F. Plays selected include *Journey's End* (Luneburg), Priestley's *Rose and Crown* (H.Q., B.A.F.O.), E. Crawshay Williams' *Slow-in a Breakfast Cup* (Buckeburg), Philip King's *Sc: How They Run* (Wunstorf), and Tennessee Williams' *The Long Goodbye* (B.A.F.O. Education Centre). Teams from the British Army of the Rhine and the Control Commission for Germany are also taking part.

Bomber Command's Principal Medical Officer

AIR COMMODORE R. H. STANBRIDGE, O.B.E., M.R.C.S., L.R.C.P., D.P.M., whose appointment as Principal Medical Officer, R.A.F. Bomber Command, was announced recently, held a similar appointment with B.A.F.O. from July, 1947, until April, 1949, when he became P.M.O. of Transport Command. His service in Germany included the busiest months of the Berlin



FOR MERCY MISSIONS: Three Westland-Sikorsky S-51 helicopters (500 h.p. Alvis Leonides) ready for delivery to the R.A.F. Fitted with external litters, as shown, the type is well suited to casualty evacuation in inaccessible mountain or jungle terrain.

SERVICE AVIATION . . .

Air Lift, which started in June, 1948, and he carried out an investigation into the effects of fatigue on aircrews employed on operation *Plainfare*. Previously he had been Senior Medical Officer at No. 2 Group, B.A.F.O., in 1946-47, and at No. 85 Group, 2nd Tactical Air Force in 1944-46.

M.T. Efficiency Award

NO. 317 Supply and Transport Column, R.A.F. Uetersen, has for the second time in succession won the half-yearly Mechanical Transport Efficiency competition held in B.A.F.O. The contest was inaugurated in 1949, and points are awarded for serviceability and low accident rates as well as for efficient organization and office work. The winning unit is commanded by F/L. W. W. Charlton.

Kenley Calling

AIR COMMODORE T. N. McEVOY, C.B.E., the Air Officer Commanding, No. 61 Group, Royal Air Force, is collecting material for a brief history of Kenley. The intention is that this should consist mainly of personal reminiscences of those who have served at the Station, strung together by a minimum of narrative and illustrated by photographs.

A. Cdre. McEvoy would be grateful if any such reminiscences and photographs could be sent to him at R.A.F. Kenley, Whyteleafe, Surrey. He can arrange for photographs to be copied without removing them from albums, which would be returned by registered post within one month of their receipt. He is particularly anxious to get more information about the period 1919-1922.

R.A.F. Amateur Radio Society

A CONVENTION for members of the R.A.F. Amateur Radio Society will be held at No. 1 Radio School, R.A.F. Cranwell, Lincs, on Sunday, April 23rd. The programme will include a tour of the radio school, a visit to the Society's headquarters station (G8FL) and club rooms, and a short general meeting. Lincolnshire members of the Radio Society of Great Britain have been invited to attend.

The R.A.F. Amateur Radio Society was formed in 1935, and has 400 members, many of them serving overseas, who regularly communicate with the headquarters station and with other amateurs all over the world. Its objects are to encourage amateur radio activities in the R.A.F. in view of their value to the Service, and as a hobby. The Director-General of Signals at the Air Ministry, A.V-M. E. B. Addison, C.B., C.B.E., is an honorary member, and the President is G/C. H. A. Evans-Evans, Officer Commanding, No. 1 Radio School. W/C. W. E. Dunn, O.B.E., founder of the Society and chief instructor at the school, is vice-president.

"Flight" photograph.

QUARTET: The C.O.'s table at the annual ball of No. 605 (County of Warwick) Squadron, R.Aux.A.F. Left to right: S/L. J. A. Timmis, who commands the squadron; A/Cdre. G. H. Vasse, A.O.C. No. 63 (West and Wales) Group; Mrs. Harcourt-Smith; and A.V-M. G. Harcourt-Smith, A.O.C. No. 12 Group, Fighter Command.

Airmen at 17

YOUTHS of 17 may now apply for part-time service with the R.Aux.A.F. or the R.A.F.V.R. Candidates for the R.Aux.A.F. will be enlisted as recruits under training and will be accepted in a trade in which there are regular instructors available to give training. Those intending to join the R.A.F.V.R. must have some experience in a trade used in the R.A.F. A.T.C. cadets who have reached the age of 17 can apply to join, whether they have gained their proficiency certificate or not.

Accepted candidates will be guaranteed whole-time National Service in the R.A.F., and every effort will be made to ensure that the individual when called up will serve in the trade of his choice. Volunteers must sign a firm undertaking to the effect that on completion of their whole-time National Service they will, if required, serve in the R.Aux.A.F. or R.A.F.V.R. for four years.

Naval Opportunities

MEN registering under the National Service Acts can apply to be considered for training as Officer Pilots or Observers in the Royal Navy during their period of full-time National Service. They will be entered as Naval Airmen and promoted to Probationary Midshipmen (A) R.N.V.R. on the commencement of their flying training. They must be prepared to join the permanent R.N.V.R. for a period of not less than five years after the conclusion of their full-time National Service. Candidates, who must possess a School Certificate or equivalent qualification with a credit in mathematics, will be required to undergo flying aptitude tests and attend a Naval Medical Board and Interview Board before registering. They should write to the Secretary of the Admiralty (C.W. Branch 554), Queen Anne's Mansions, S.W.1, for an application form, about two months before they are due to register, and will be required to obtain a recommendation that they are likely to prove suitable Naval officers for aircrew duties. An undertaking will also be required that they will be prepared to commence their National Service Training at any time shortly after their date of registration, and will not make a request for a deferment on any grounds.

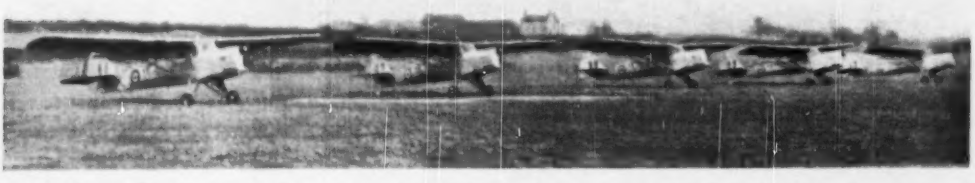
This scheme, which is open to men whether already serving in the R.N.V.R. or not, is in addition to the arrangements already existing by which men between the ages of 17 years 8 months and 20 years may apply for Short Service Commissions as Officer Pilots and Observers.

Reunions

NO. 524 Squadron. — Reunion on Saturday, March 18th, 1950, at 6.30 p.m., at "The Clarence," Whitehall, London, S.W.1. Details from B. Haller, Land of Green Ginger, Hull, Yorks.

* * * * *

Former officers (World War 2) of No. 44 Group and O.A.C., Transport Command.—Reunion in London on Friday, March 31st. Details from T. Morris, 17, Hyde Park Street, London, W.2.



AUSTERS AWAY: Five new Auster T.7s (145 h.p. Gipsy Major 7) await the arrival of R.A.F. ferry pilots; a recent scene on the manufacturers' airfield at Rearsby. Members of No. 2 Ferry Pool, led by F/L. R. B. Sillars, took delivery of the aircraft.

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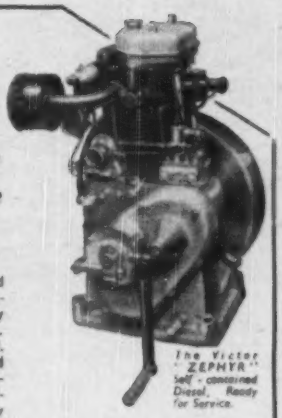

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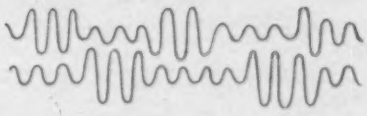

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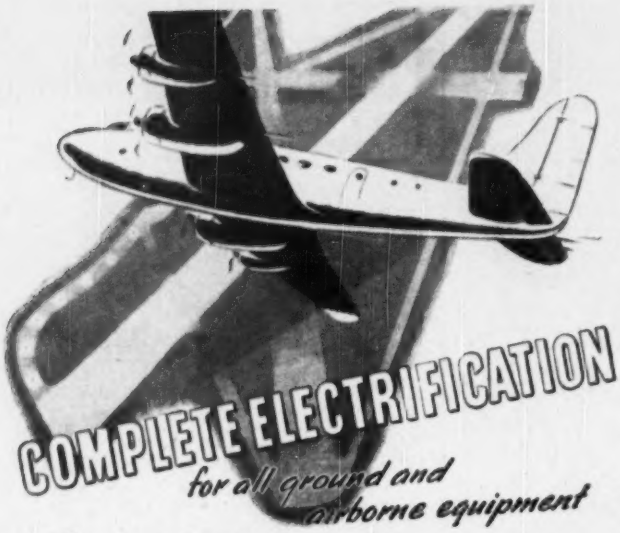

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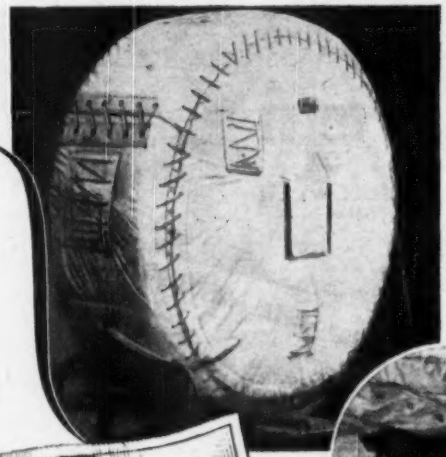

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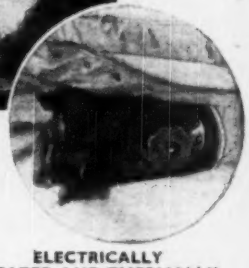

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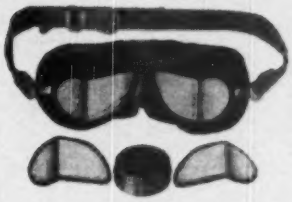

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